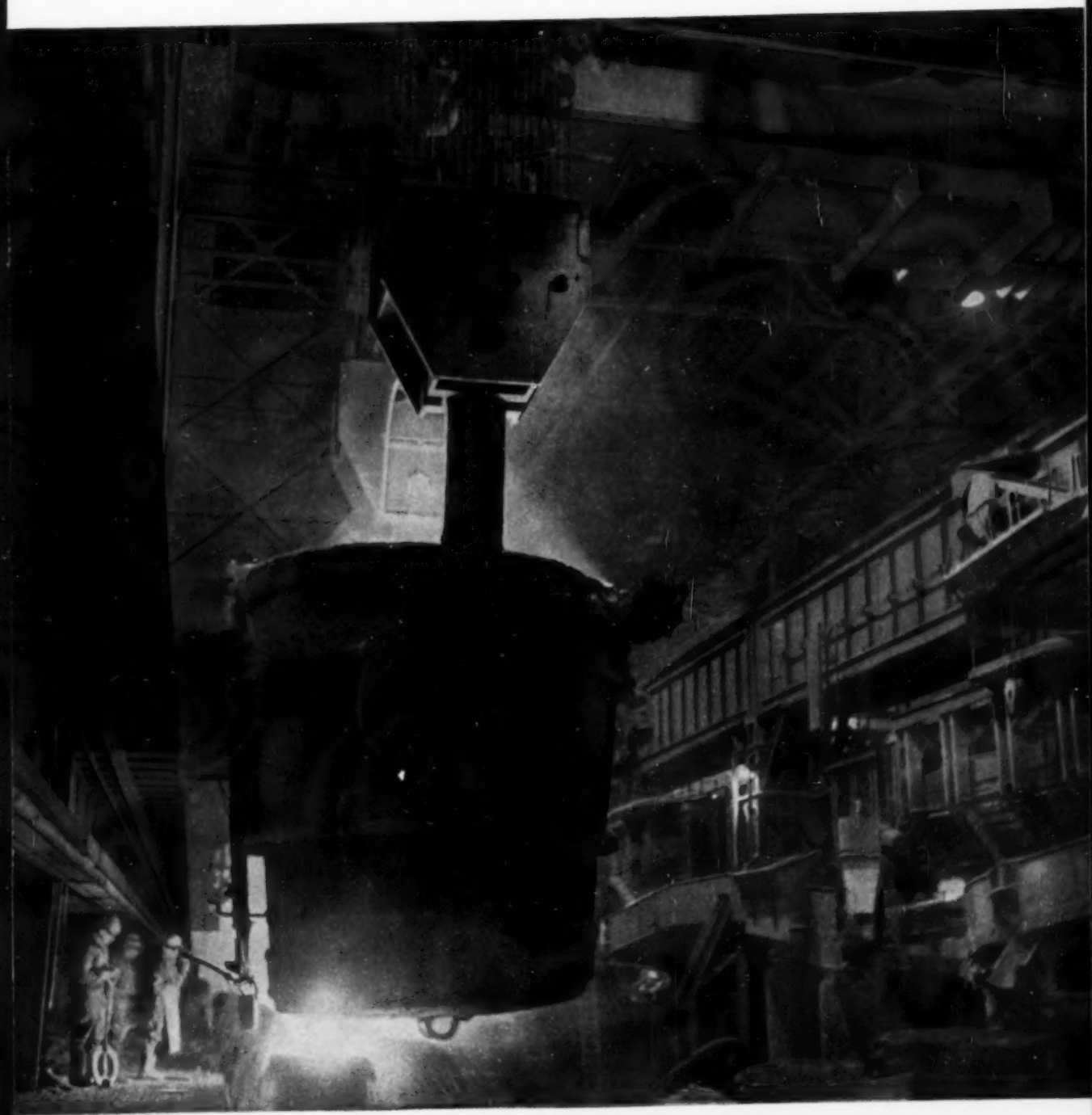
A CAHNERS PUBLICATION

JANUARY, 1961/75c

Brick & Clay RECORD



ANNUAL REFRACTORIES ISSUE

"For Toughest Problems, Bonnot Equipment Provides Most Dependable Answers," say Davis Firebrick Production Specialists

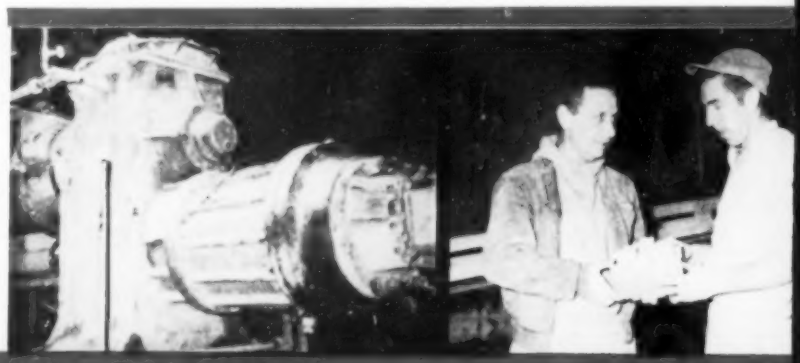
One look at the colorful Catalog and Data Manual covering the hundreds of refractory products manufactured by the Davis Firebrick Company, of Oak Hill, Ohio, gives some idea of the *multiple clay processing problems to be solved effectively and economically.*

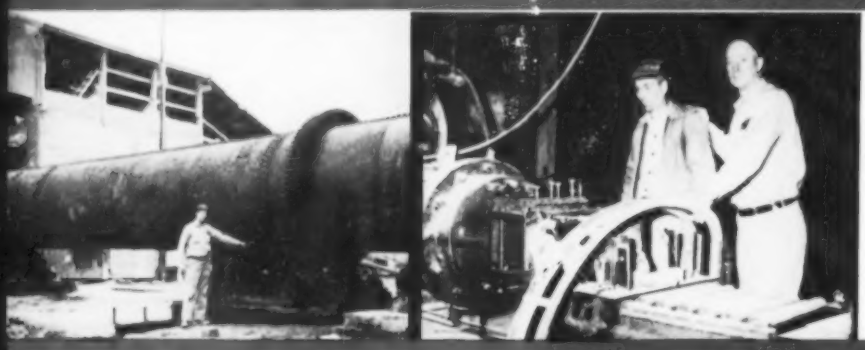
For years Bonnot Equipment — FROM EXTRUDERS TO DISC FEEDERS AND ROTARY KILN FOR CALCINING CLAY — has been a major factor in maintaining production schedules required by the largest independent refractory producer in the world.

DAVIS PLANT...

"Good sound equipment we can count on all the time," is the way Jack DeHart, (right, center) Production Manager, and Bob Sutton, describe a Bonnot Challenger extruder. "We sure like the 'solid front' because the 1-piece design entirely eliminates pesky leaks."

Production includes 9" series brick, back circles, kiln bottoms and many special shapes — with an average day's run in excess of 12,500 refractory units . . . "without any worries about downtime or workability of the clay."





SIVAD CERAMICS.

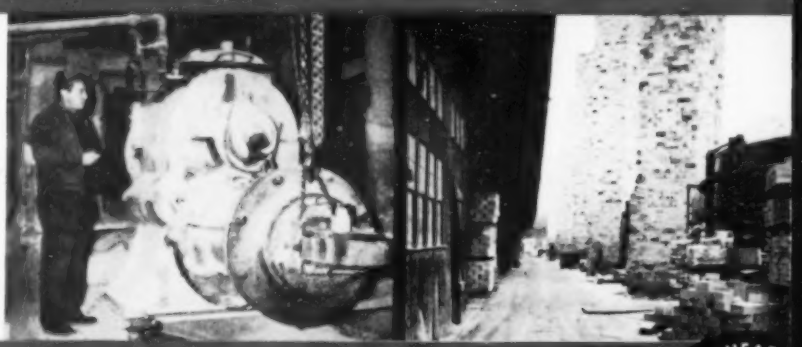
24 hours a day, 7 days a week on year-'round sch since 1954 typifies the demands made on the 100 Bonnot Rotary Kiln used for calcining clay, points Production Manager William Sutton, (left, center).

Subsequently this material is fed by Operator Howard H (center) into a Bonnot Challenger that extrudes de- plastics for many types and sizes of "plastic firebr Sivad specialties are shipped into Canada and dow South America, as well as throughout the United Stat meeting both government and commercial specifica

CAMBRIA PLANT...

Cupola linings, acid brick and an amazing variety of intricate refractory shapes are produced in surprising volume daily in the Blackford Plant by a Bonnot Viking.

"Our clay is tough to handle," reports Plant Manager Ed Smith, (center). "But since we began using a Bonnot machine in 1941 we've been able to keep production up to schedule while we hold down maintenance expense."



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DRY PANS	SPECIAL EXTRUDERS	DIES
WET PANS	PUG MILLS	MIXERS
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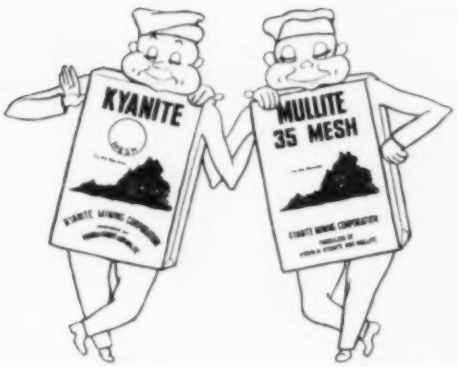
STEP AHEAD

LEADING the PARADE to BETTER PRODUCTS



The high quality of Virginia Blue Crystal Kyanite and its derivative Mullite is constantly being improved by continuing research. Available in mesh sizes 35, 48, 100, 200, and 325.

World-wide demand for Virginia Kyanite comes from many industries including ceramic, refractory, foundry, glass, and metallurgical fields. *High in alumina and very low in iron content,* Virginia Kyanite imparts great strength and refractoriness to any high temperature product.

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•

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High Duty

MULLITEX,
Super Duty

MULLITEX HB,
Super Duty,
High Burn

HI LUMITE 50
HI LUMITE 60
HI LUMITE 70
50, 60, & 70%
Alumina Content,
respectively

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CASTABLES

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H & B CASTABLE
and
SUPER CASTABLE
#32 (3000° F)

LITE WATE #50
Insulating

LITE WATE #70
Insulating

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PLASTIC FIRE BRICK

WALSH PLASTIC FURNACE LINING

WALSH SUPER PLASTIC FURNACE LINING

•

MORTARS

MORT-AIRSET,
high temperature cement for air tight joints in all fire brick work.

METALOK, heat setting mortar for bonding fire brick to retain metal and slag.

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Exacting Requirements of the Space Age are met and mastered in Walsh Refractories. From pit to lab to finished product—under strictest standards of quality control—Walsh sets the pace with increased clay reserves, improved research facilities and continued important additions to plants and equipment. With constant progress as its goal, Walsh sets its sights on playing an increasingly important role in the great refractories industry.

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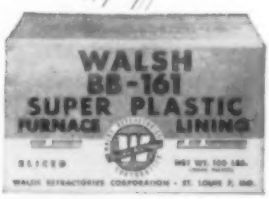
An airsetting plastic producing high strength at low temperatures, ***installations of which do not require immediate burning in.*** Strength increases as burned in temperatures are reached. Wire, write or phone for complete technical data.



WALSH MORT-AIRSET

An airsetting high temperature bonding mortar for laying up and surfacing high duty and other grades of fire brick. Only Walsh MORT-AIRSET gives you all the "extras" . . . extra strength . . . extra workability . . . every performance characteristic you've ever wanted in a refractory cement. Guaranteed not to ball or gum up in the drum even during extended periods of storage.

WALSH SUPER CASTABLE NO. 32

A high alumina content refractory for casting, airgunning or troweling with exceptional compressive strength throughout its entire service range which is beyond that of Super Duty Brick. Recommended for patching firing arches, making quick repairs in periodic and tunnel kilns as well as casting crowns and sidewalls.

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An hydraulic setting refractory concrete with high resistance to thermal shock coupled with excellent non-shrinking qualities. Recommended for and used extensively in providing a firm, extremely serviceable foundation in kiln car tops.

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Fire Box Arches constructed of Walsh K-11 ramming mix demonstrate in full measure the ability to successfully resist high temperatures and severe thermal shock without deformation following extended periods of hard usage ... your assurance of exceptional service life at lowest cost.

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FIRE CLAY SPECIALISTS IN REFRACTORIES OF HIGH BULK DENSITY AND LOW POROSITY

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THIS MONTH'S COVER

In the steel industry, so colorfully depicted on our cover, as in a number of other industries which involve the use of heat, refractories play an indispensable part. The contribution of refractories to the American standard of living cannot be overemphasized. A wide variety of refractory products, their compositions and uses, is featured in this issue of BRICK AND CLAY RECORD. (Photo courtesy Jones & Laughlin Steel Corp.)

A CAHNERS PUBLICATION

Brick & Clay RECORD

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With a demand for lightweight aggregate in Mississippi and with a limited supply available, a leading producer of lightweight concrete entered the clay processing industry and is now manufacturing Miss-Lite.

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Leading Clay Journal of The World
Established 1892; *Now in* 68*th Year*

The magazine of brick, drain tile, structural tile, clay aggregate, terra cotta, roofing tile, refractories, clay pipe, and abrasives.

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UNIFRAME **IS NOT THE SAME . . .**

At a glance, the steel framework above, shown during construction at Clay Products, Inc., Holly Springs, Mississippi, may look similar to other rigid frame structures. But it is not the same. It's Uniframe, available only from Varco.

Uniframe means the clear-span steel framework is solid . . . one piece. The clutter of nuts and bolts has been eliminated through Varco's welding process. It creates a strong, rugged building . . . a better building —for less.

Varco has long been a specialist in buildings for the brick and clay industry. Kiln buildings, Clay Storage, complete plants . . . you'll find Varco structures in practically every clay product producing section of the nation. In this industry, more Varco buildings are being erected than any other type.

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"6,000,000 UNIT INCREASE WITH ADDITIVE-A®" —says Indiana brickmaker.

MARTINSVILLE, INDIANA—Mr. Thomas D. Fleming, manager of Martinsville Brick Co., says: "After using Additive-A clay conditioner for a full year, we are able to compare results. We found that due to reduction of tempering water, we increased our production by approximately 6 million brick units. During this period we did not have a single complaint from dealers on chippage, scumming, laminations or variation in size. We wouldn't operate without Additive-A because it helps us produce more and finer quality bricks at less cost."

For further information on Additive-A, write to:
Chemical Products, Department No. BCR-11
Kimberly-Clark Corporation,
Neenah, Wisconsin

Kimberly-Clark Corporation Contributing Associate S C P I
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Uniformity of color over your whole firing range is but one of several advantages you get in these green oxides developed by Ferro. You'll find them strong enough to carry your deepest shades, yet easily "stepped down" for lighter hues—always *clean*, attractive. ■ Produced with a complete, and *up-to-date* knowledge of techniques, processes and quality controls used for glaze, engobe and other brick coatings, Ferro inorganic colors are "customized" to your specific needs. *Complete* mill formulas are supplied you, another reason Ferro colors work so well. ■ So let us help you get *better greens*, or a whole range of dependable colors. Tell us about your equipment, firing ranges, type of clay and method of applying color when writing. Why not write us today?

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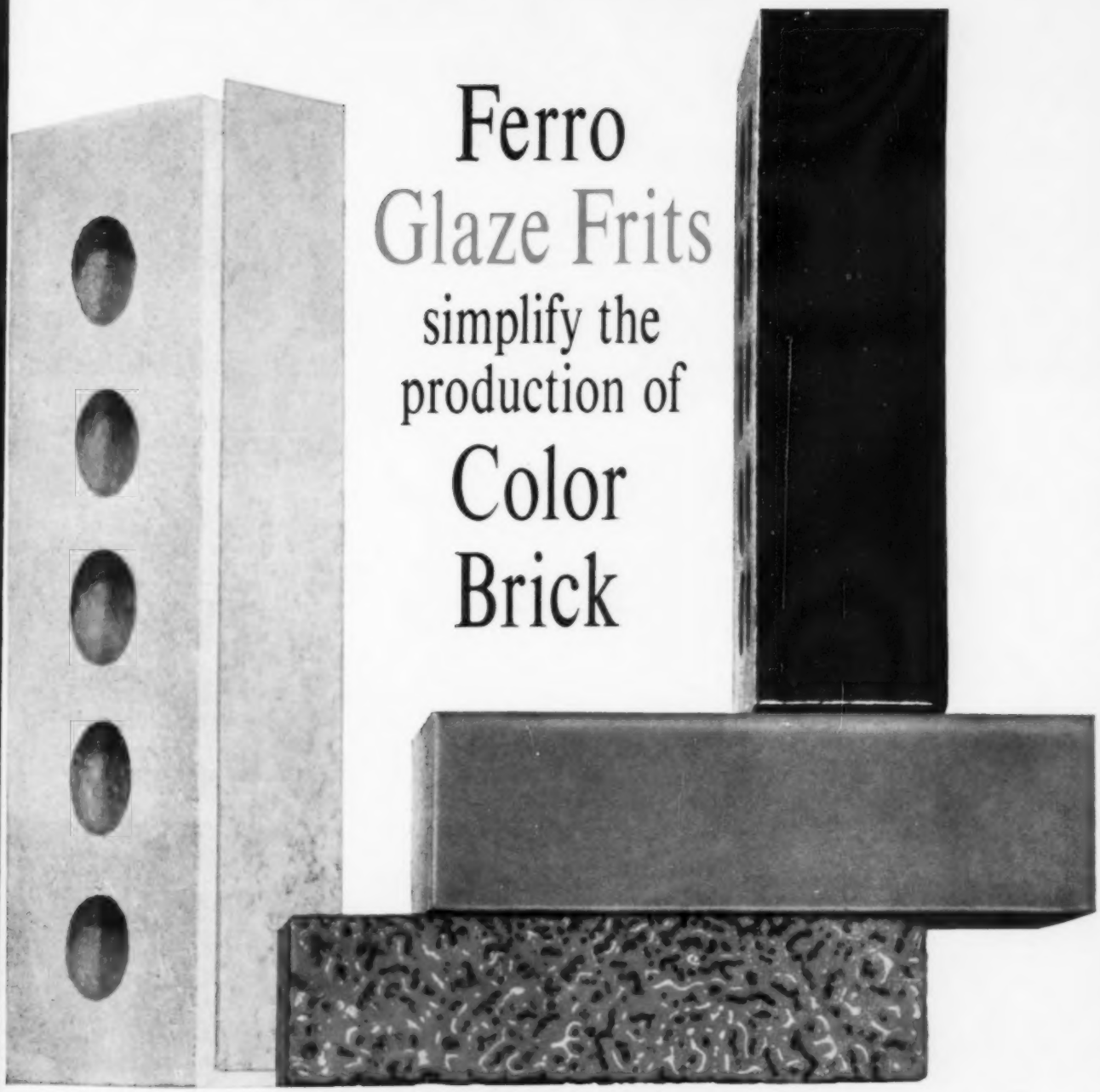
Ferro Glaze Frits simplify the production of Color Brick



Trouble-free production of glazed color brick is highly dependent on the glaze-frits that are used. On their "clear glass" quality, their workability, their consistent uniformity, their *complete compatibility* with the inorganic colorants required to best provide the colors desired. ■ That there is a big difference in glaze-frits, many brick producers have discovered. And they find this difference can mean better production, consistently higher quality, in their brickmaking operations. ■ Ferro produces glaze-frits for all body materials—fire clay, shale, clay grog and lightweight aggregate mixes. They work well in all colors in cleanable matte or high gloss finishes. You'll find them *entirely predictable*. Sound good? We invite you to *try* them.

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. . . you get a ceramic plant designed for economical operation and quality product. Because ceramic plant specialists have the know-how and the proficiency to provide the complete, coordinated and mechanized plant package to manufacture your structural clay products from the receiving of your raw materials to the shipping floor of your finished product.

That is why it will pay you to consult engineers specializing in ceramic plant design and installation.

HENDRYX
CERAMIC PLANT DESIGN

DWIGHT B. HENDRYX AND ASSOCIATES
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PITTSBURGH 17, PA.

Tunnel Kiln

(above) Hendryx-designed, 280 foot tunnel kiln with three separately controlled firing zones and quenching and annealing zones, for burning buff face brick. Waste heat is salvaged for use in dryers.

Manufacturing Unit

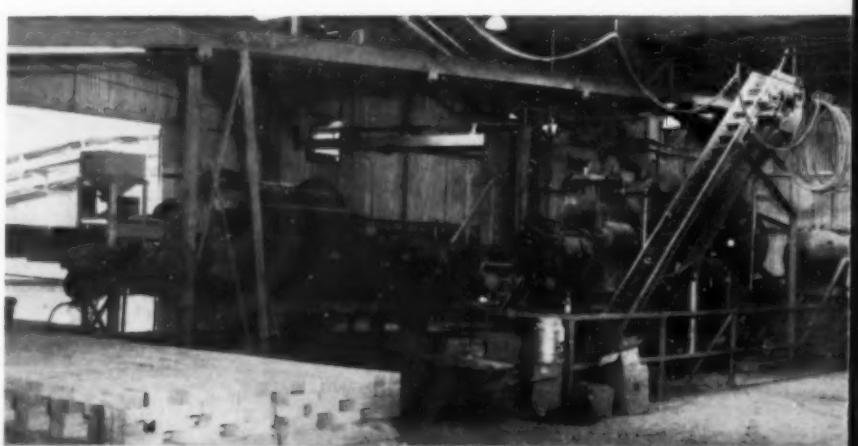
(right) This unit, serving a tunnel brick kiln, extrudes, molds and cuts in a compact and efficiently arranged area, economical of plant floor space.

Setting Kiln Cars by "Lowervator"

(below) Platform is lowered at slow, adjustable speed for uniform level setting. Eliminates stooping and lifting, increases setting speed 50%, cuts setting tracks and labor cost 33%. Cars are moved on, off and along tracks automatically.

A Recently-built Plant

(lower right) Dryer racks of green sewer pipe in foreground; loaded kiln cars in background. Overhead are waste heat pipes from kiln to dryers.



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Miller Double Rotor Hammermills give up to 100 tons per hour of minus 8 mesh material. Miller Hammermills can be used for primary reducing—secondary reducing—tailing reducing—or they can perform any combination of reducing jobs. You get bonus pulverization because you can depend on Miller's Double Rotor Hammermills for rugged, trouble free service. Let Miller engineers test run a sample of your material—you'll agree you get more and better fines with Miller Double Rotor Hammermills. Call, write or wire Miller for information on any engineering problem.

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- Replaceable Hammers and Tips
- Manganese Steel Hammer Tips and Grates
- Precision Balancing
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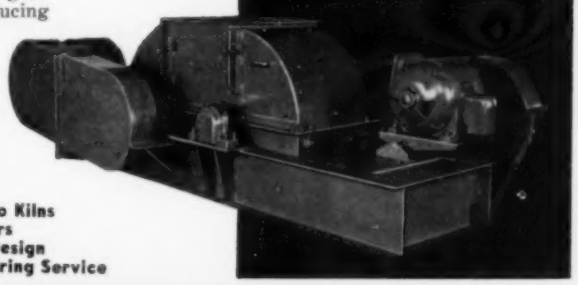

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Test shows amazing Hot Load Capacity of new Harbison-Walker Refractory

The hot load test results of KORUNDAL XD compared with similar high-alumina brands are most revealing. Whereas, KORUNDAL XD showed no subsidence in a special, severe load test at 3000°F., the other brands in the same test deformed 5.1% and 9.6% (see above photo).

KORUNDAL XD is very dense, strong, and has good resistance to thermal shock. This unprecedented combination of high hot strength and improved physical properties will suggest solutions for many of your furnace problems. Our engineers will be glad to give you complete technical information.

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Letters
to the editor

Lightweight Clay Block

Editor, BRICK AND CLAY RECORD: I look forward each month to receiving my copy of B & C R to see what is new in the "Lightweight Clay Block" development. Many thanks for continually hammering at the Clay Products Industry to get busy and do something. I have been working on the development of a clay bonded block for two years, and have solved many problems but there are many yet to overcome. Your confidence in the ultimate possibilities of this product keeps my spirit up when I apparently reach a point of complete failure.

You might be interested to know that I have a pilot plant operation that could be converted into limited production, provided I solve a few more problems.

I am using a Lithibar two block, concrete machine that cycles four times per minute. It will vibrate, tamp and press. We have run over one hundred tests of 12 block each. Our best blocks will stand 240 lbs PSI dry and 1275 lbs. PSI fired. I could list a thousand things that we have done wrong and only a few things we have done right, but time nor space will permit.

I only want to let you know that I am working and have confidence in the future of the clay bonded block, and that I am looking forward to attending the March conference.

James W. Hanson
President,
Mineral Wells Clay Products, Inc.

We thank Mr. Hanson for his letter and we trust that many others will join him at the B&CR conference. For more information on the conference turn to page 33.

Principle Reason For Subscribing

Editor, BRICK AND CLAY RECORD: My principle reason for subscribing to the Record is that it keeps me in touch with what is going on in our particular line and also with the personnel.

I was directly connected with clay products for over 50 years and while I am now retired, the company still maintains an office for me here,

which I come to most every working day to keep abreast of what is going on in our own company and with the addition of the Record it keeps me pretty well posted in the national picture and I look forward to each issue as it comes.

It is a source of considerable pleasure to me to see the tremendous strides the industry has made in the line of cooperation with each other which has resulted in the decided up grading of our products and personnel as well which to me is a great source of satisfaction. Wishing you the compliments of the Season, I remain,

Arthur T. Wintersgill

Editors' Note: *Mr. Wintersgill is a former president of Pacific Clay Products in Los Angeles, Calif. We were very glad to hear from him and wish him continued success and activity in the clay products industry.*

Editors Express Thanks

The editors of Brick & Clay Record wish to express their thanks and appreciation to the following people and organizations for their greetings during the Holiday Season:

David S. Way of Kaiser Refractories & Chemicals Div., International Harvester Co., Morton Printing Co., Engineered Materials, A. B. Segur & Co., Philadelphia Quartz Co., George Eyerly of Malvern Brick & Tile Co., Miller Equipment Co., Dodge Manufacturing Co., Structural Clay Products Research Foundation.

Also: Region 5 of SCPI, Gordon E. Lewis of Glen-Gery Shale Brick Corp., Ted Berger of Expanded Clay & Shale Ass'n., Allis-Chalmers Co., Southern Brick & Tile Manufacturers Ass'n., R. W. Fross of A. P. Green Co., F. W. Dodge Corp., Sapulpa Brick & Tile Corp., W. S. Hoggan and E. Wyman of Home Brick Ltd., Allied Brick Sales, Tubular Structures of America, Rhodes Chemical Co., The Charles Brunelle Co., Carvell Tefft, Emma (Nawrot) and Joe Strett, D. M. Strickland, E. W. Valensi, Compania Industrial de Zacatecas S. A., Meyer Leventhal of Compania Minero Salupo, S. A., Heinz Behrens and Karl H. Hensiek, both of Germany.

BATCHMASTER

CONTROLS **H. K. PORTER PASCAGOULA PLANT**

3000 LBS BATCHED EVERY 5 MIN

This Howe Batchmaster® automatically controls batching of refractory brick mix from bin discharge to delivery of the mix at the presses in the new Pascagoula, Mississippi plant of the H. K. Porter Company, Inc.

One man operates the console, which combines ingredients from any of 60 bins and turns out repeat batches exactly alike. In brick production, the Batchmaster channels the mix through controlled mulling and automatic delivery to presses. In specialty production, it directs the ingredients to a drum mixer before bagging. The batch formula can be easily changed by turning ingredient dials.

The advantages of automatic batching—effective material control, improved product quality, increased production, lower production costs—can be yours, too. To learn how, write for your copy of the AUTOMATIC BATCHING HANDBOOK.

HOWE®

THE HOWE SCALE COMPANY
RUTLAND, VERMONT

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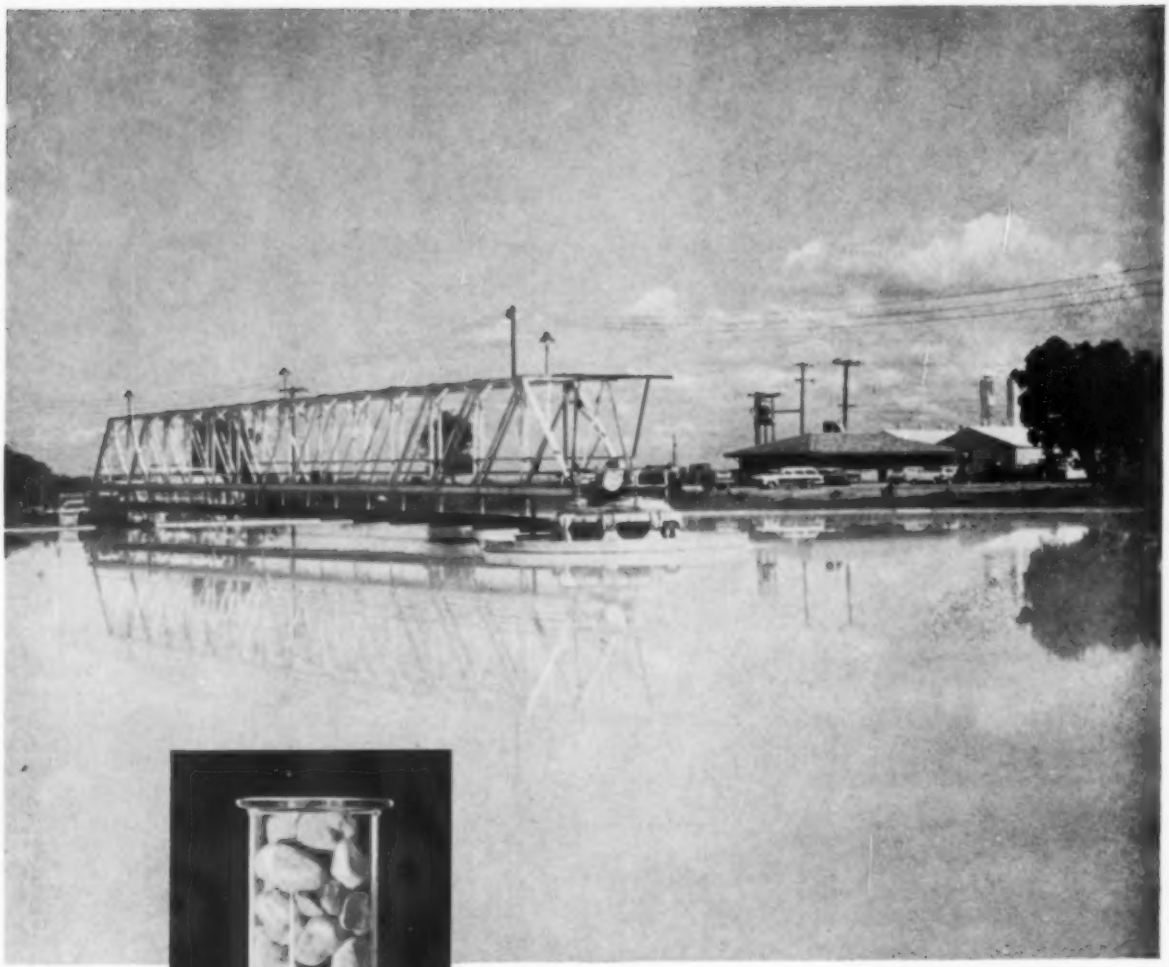
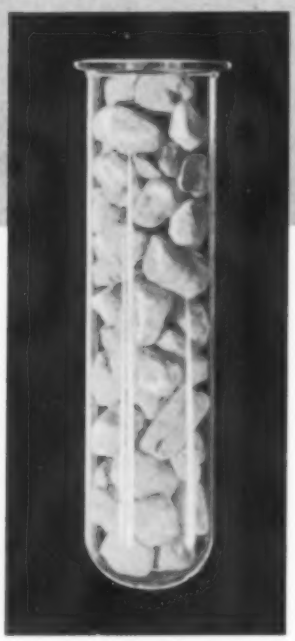


*SEE NOTE



FROM THIS HUGE THICKENER COMES UNIQUE RAW MATERIAL FOR SUPERIOR REFRACTORIES

One of many extra GMcB touches that produce plus quality refractory products for long service life—and lowest furnace operating costs.

GLADDING, McBEAN & CO. REFRACTORIES DIVISION

FIRST IN THE FURNACES OF WESTERN INDUSTRY

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*Cover Photo From "The Ione Story," A Color Brochure On GMcB's Unique Raw Material Processing
Write For Free Copy To 2901 Los Feliz Blvd., Los Angeles

Circle Service No. 22

IF YOU MAKE BRICK

we can show you how to COLOR it!

Until recently, brick coloring was largely confined to the use of colored glazes, yet relatively few manufacturers could fit glazing into their brick-making processes. As demand increased for more and more color on brick, we developed economical coloring methods which all face brick manufacturers can use. Colored engobes and colored sands are a direct result of our research, so Drakenfeld can now offer a coloring material to suit almost any brick processing setup.

Whatever your plans for producing colored brick, an experienced team of Drakenfeld color ceramists will gladly assist you with prompt, dependable solutions to your coloring problems. We cordially invite your inquiry.

SAND COLORS: If you use a sand mold, sand blast, or any kind of sand finishing operation, Drakenfeld has a complete palette of colors for you. They are colors you merely mix with your sand and apply by your normal sand coating technique. No change in processing—no special processsing required. The cost is low.

ENGOBE STAINS: Engobes can provide a permanent colored surface for your brick at low cost. Engobe formulas available on request. The mixes are easy to prepare.

GLAZE STAINS: Strong yellows, clean pinks, stable blue-green and grays. A complete line of quality stains . . . laboratory controlled to insure maximum workability and uniformity.

GLAZE SPECKS: Years of leadership in speck production enable us to recommend the best speck for your needs, sized to exacting specifications.

PREPARED GLAZES: For brick manufacturers who wish to produce limited quantities of glazed brick without investing heavily in glaze preparation equipment. These glazes are supplied completely ground and ready to mix with water. Wide range of brick and pastel colors are available.

CALL ON Drakenfeld

YOUR PARTNER IN SOLVING COLOR PROBLEMS

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Executive Offices: **45 Park Place, New York 7, N. Y.**

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Circle Service No. 23

if it's in bulk...

TOTE SYSTEM*

and only Tote will handle it

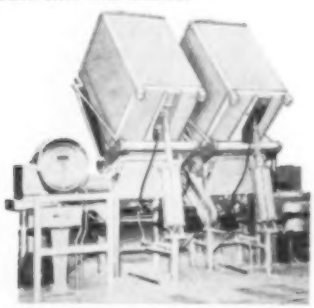
in-plant or inter-plant

with the efficiency and economy of automation

the flexibility and versatility of unit containers,

and the product protection of sealed containers

Automatic control panel programmed to weigh 12 ingredients from 12 Tote Discharge Tilts into one mixer.



Two Tote Bins discharging from Tote Tilts into automatic weigh hoppers.

TOTE is a complete, mechanical, fully automatic system based on metal containers plus filling and discharging equipment.

The Tote System answers to bulk handling problems are explained in detail in this new booklet.

Write for it TODAY

TOTE SYSTEM, INCORPORATED

614 So. 7th, Beatrice, Nebraska

Subsidiary of Hoover Ball and Bearing Company

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Circle Service No. 24

Circle Service No. 25 →

NEW HANCO FLUX POWER SCREEN HEATERS

PHENOMENAL—
POWER IS CONDUCTED
THROUGH THE AIR

- **DUAL VOLTAGE**
  220/440/550 volt
- **3 PHASE**
  on larger models
- **5-YEAR GUARANTEE**
- **ANTI-MAGNETIC SIDE RAILS**
  Either type as shown below

- **DUST-TIGHT**
- **WATERPROOF**
- **COMPACT, RUGGED CONSTRUCTION**
- **SCREEN CLOTH INSULATION**
  On both sides for complete protection

Pat. Appl. for

Flux Power Eliminates Z-Bar Connectors
Use either Plain or Stainless Cloth

This major break-through by HANCO ENGINEERS OFFERS OPTIMUM EFFICIENCY in screening and sizing of moist materials. Replacement of cables and laminated flexible conductors is eliminated.

HANCO HEATER VERSATILITY permits optional location on various types of screens.

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For Abrasive Materials

AVAILABLE WITH EITHER TYPE TENSIONING RAIL

For Non-Abrasive Materials

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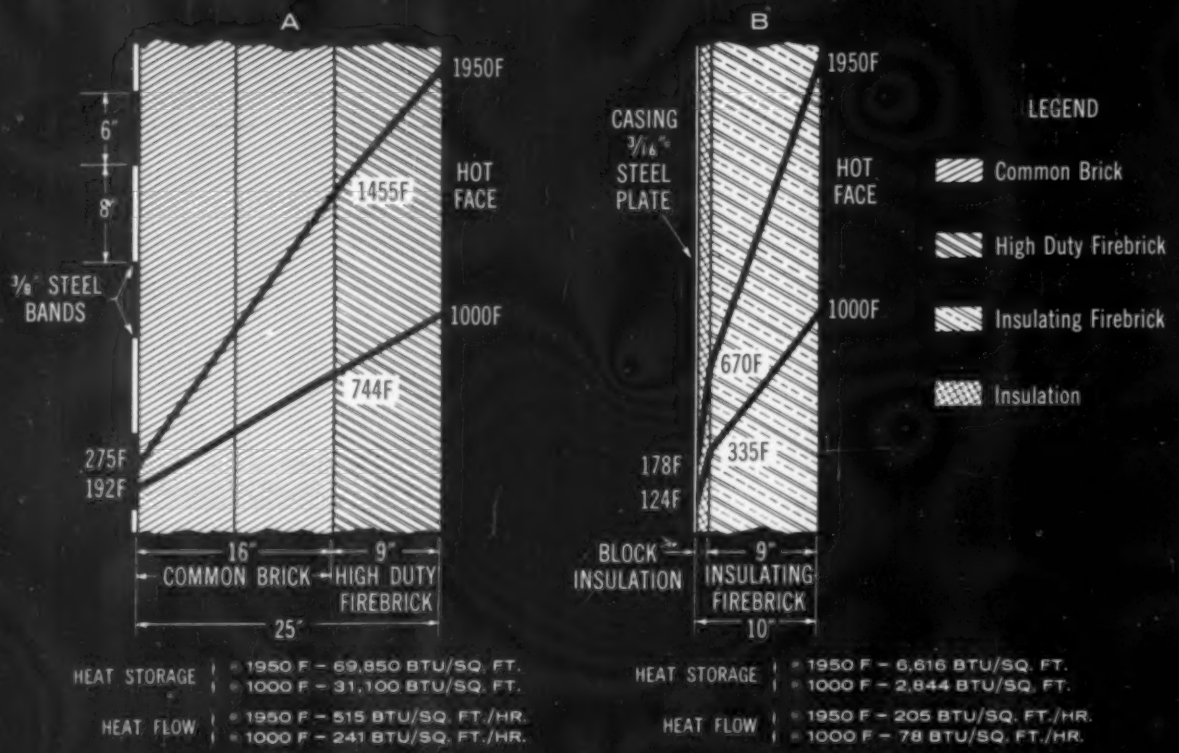

Comparative Heat Storage and Heat Flow for Thick Kiln Wall vs Thin Kiln Wall Construction

FIGURE 1

A DESIGN THAT DELIVERS PROFITS

Modern, thin wall, insulating firebrick lined, steel cased kilns cut costs many ways. Here's how:

That sounds fine, but can I maintain an even kiln temperature while reducing total fuel input?

Yes, because an insulating firebrick lining possesses far greater sensitivity to temperature change. As a result, an IFB lined kiln provides faster response to changes in firing rate. Because of the low heat storage characteristics of an insulating firebrick lining, changes in the combustion rate are followed rapidly by changes in kiln temperature. The added heat input goes into the ware, not the wall. This rapid response means reduced firing time, less fuel consumed—more profitable operation.

You say that furnace output is increased also?

Yes. Taking the same example—comparing a 25" wall to a 10" wall in a typical 38' 2" radius kiln—the thin wall construction provides an additional 12.5% increase in floor area and offers increased kiln capacity and output.

What about the problem of culls? Does this design offer any improvement in product quality?

Another of the advantages of a steel cased B&W IFB lined kiln is tightness. A fully cased kiln provides a tight wall construction. There is no cold air leakage into the kiln—no cold spots in the kiln to adversely affect the ware under fire. A tight steel cased kiln permits the maintenance of a uniform temperature gradient from top to bottom of the kiln. The result is fewer burnovers, and increased profits.

I operate several periodics. Can you explain why cycle time is improved in IFB lined periodic type kilns?

The low heat storage properties of insulating firebrick reduce cycle time in periodic type kilns. The low quantity of heat stored by an insulating firebrick wall can be absorbed and dissipated much faster than the larger amount stored by a dense wall construction. This means that your kiln heats up and cools down faster. Our experience over the years has shown that you can reduce heating time from 10 to 20% with an insulating firebrick wall construction—and you can cool your kiln down as fast as the ware will permit.

With faster cooling, the kiln must be more comfortable to work in. Is this true?

Another benefit provided by the thin wall, insulating firebrick lined kiln is improved working condition. The faster cooling time made possible only with a lightweight B&W Insulating Firebrick lining means improved worker comfort—increased production—greater return for your labor dollar.

What are the basic economies of thin wall, steel cased kilns?

One of the most significant developments to come forth in the last 15 years in the structural clay products industry is the thin wall, steel cased, insulating firebrick lined kiln. Note the difference in wall thickness shown in Figure 1. Offering the combined savings of reduced capital investment and lower operating costs, this new design increases production and profits. Thin wall IFB lined kilns provide the following benefits to the kiln operator:

1. Reduced capital investment as installed

2. Reduced fuel costs

3. Faster response to changes in firing rate

4. Improved product quality

5. Reduced cycle time in periodic type kilns

6. Improved working conditions

The following discussion provides the answers to many of the questions B&W has been asked about the money-saving, profit-building potential of this design.

How can a thin wall insulating firebrick lined kiln reduce my capital outlay?

One of the most notable advantages of thin wall insulating firebrick lined kilns is the savings in total capital investment. Total capital investment is dependent on (1) material costs, and (2) construction costs. Let's examine both. Figure 2 gives a typical evaluation of the total capital outlay for both constructions. Note that this comparison does not include the additional savings in reduced foundation costs that result from the lower weight of the kiln.

While an evaluation of this type will vary from kiln to kiln, depending on such factors as plant location, source of supply, etc., you can see that total costs will favor the thin wall, steel cased IFB construction.

I notice that you keep emphasizing that this is a thin wall construction. Why?

In Figure 1, we have compared two wall constructions that might be found in typical kilns. In one construction—labeled "A"—are 9 inches of dense firebrick, backed up with two 8 inch courses of red or common brick—*a total wall thickness of 25 inches*. This type of construction requires the use of steel bands for sidewall support.

The steel cased, insulating firebrick lined kiln—construction "B"—has a 3/16 inch steel casing around the kiln for the full height of the sidewall. The lining is 9 inches of IFB, generally with a use limit of 2000F, backed up with 1 inch of block insulation or insulating refractory castable—*a total wall thickness of 10 inches*.

This difference in wall thickness means a 66% reduction in brick laying time, alone.

How can operating costs be reduced?

Another major advantage provided by the thin wall, insulating firebrick lined kiln is reduced fuel costs. As seen in Figure 1, the steel cased construction—construction "B"—provides a lower outside wall temperature for a given hot face condition than does construction "A"—and it is 15 inches thinner! There is only one reason why—the insulating firebrick lining. Insulating firebrick are light in weight—they conduct less heat. This light weight results from the porous structure of insulating firebrick—porosity designed and built into the brick. Each of the tiny pores in an insulating firebrick acts as a barrier to the flow of heat. In Figure 1, the IFB construction conducts less than half as much heat through the wall. The fuel you burn heats the kiln, not the atmosphere around the kiln. Instead of paying fuel bills to heat your yard, you pay only to heat the kiln.

Approximate Cost Analysis of Heavy Brick vs. Insulating Firebrick Kiln Wall Construction

MATERIAL	UNIT PRICE DELIVERED	PRICE—DOLLARS PER SQ. FT.	
		CASE A	CASE B
HIGH DUTY FIREBRICK.....	$150/M	$1.92	$ —
FACE BRICK.....	50/M	1.80	—
MORTAR (FIRECLAY).....	40/NT	.20	—
STEEL BANDS (INSTALLED).....	.....	1.98	—
2000° INSULATING FIREBRICK...	205/M	—	2.62
MORTAR (AIR SETTING).....	145/NT	—	.19
STEEL SHELL (INSTALLED).....	.....	—	1.95
1"-1600° BLOCK INSULATION (INSTALLED).....	.....	—	.58
LABOR.....	100/M	4.88	1.28
TOTALS		$10.78	$6.62

Case A—Walls=9" High Duty Firebrick +16" Facebrick Banded by ⅜" x 6" Steel Bands and Turn Buckles

Case B—Wall=9"-2000° Insulating Firebrick + 1"-1600° Block Insulation + 3/16" Steel Casing

FIGURE 2

That's fine, but are these fuel savings significant enough to worry about?

Definitely. Lightweight not only means lower heat flow—it also means lower heat storage. In Figure 1, the lightweight insulating firebrick lining of the steel cased kiln stores 90% less heat than the dense, heavy wall of construction "A" for a hot face condition of 1950F. This means that to bring the ware in your kiln to a given temperature, you burn less fuel. Why? Because you are putting up to 90% less heat in the walls! Scores of case history studies have proved that B&W Insulating Firebrick save an average of 20-25% in fuel costs.

For further information, write The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

R-434

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, Castables, Plastics and Mortars, Silicon Carbide, Ramming Mixes and Ceramic Fiber.

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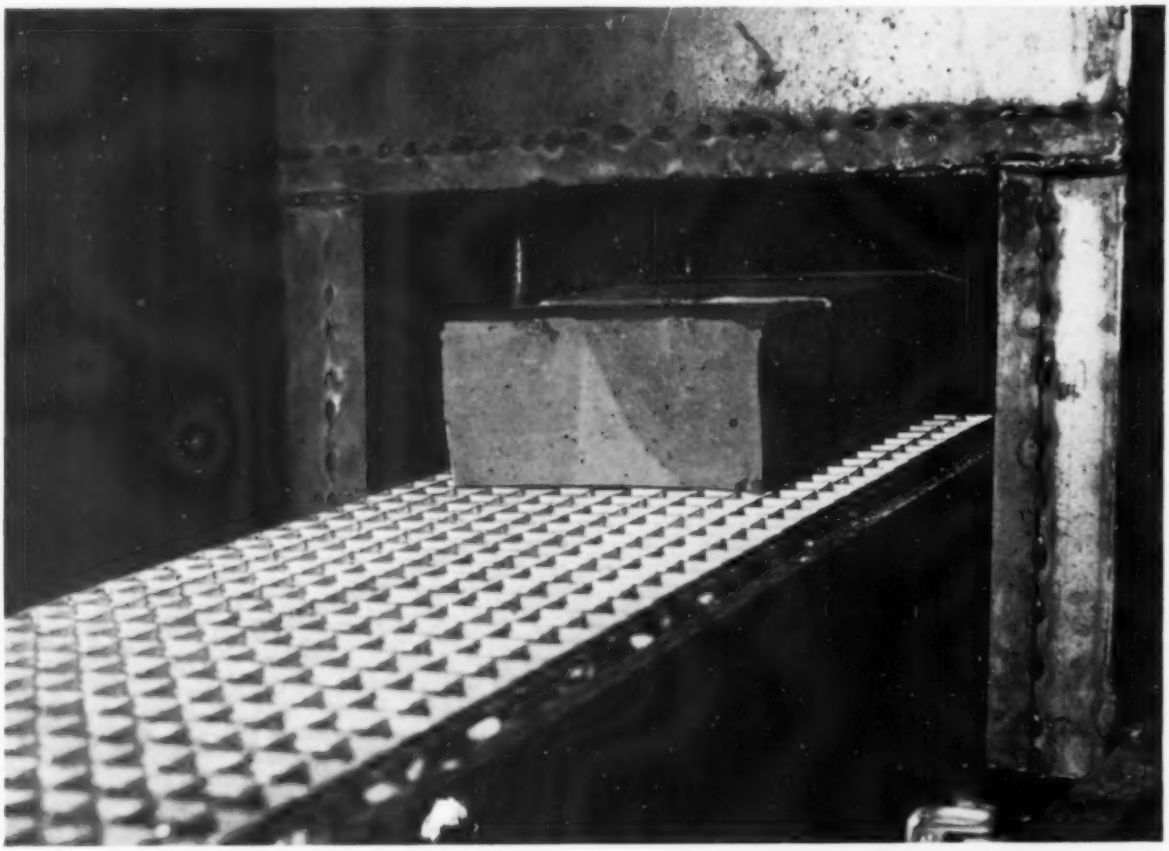
Circle Service No. 26

NEWS from Dow Corning

The Finishing Touch

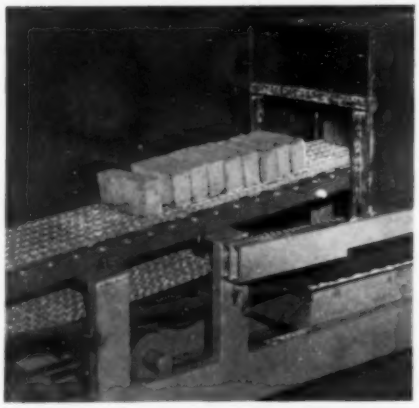


Easy, Low Cost Way to Give Your Brick New Sales Appeal

Here's a treatment that protects the original beauty of your brick — *builds in* some excellent new selling features. It's Silaneal®, a sodium siliconate treatment that makes brick water-repellent . . . minimizes efflorescence, keeps dirt on the surface where it rain-washes away. Result: Your brick stays clean in storage . . . beautiful during and after construction. And most important, your customers stay happy with your product!

Small Investment — Big Return

Silaneal treatment is inexpensive from every standpoint including equipment, labor and material cost. Most present users find Silaneal returns more than it costs — in fewer customer complaints, in reduced yard staining, lower selling costs and expanded markets.



Spray equipment for applying Silaneal specially designed by Dow Corning.

SUSTAINING ASSOCIATE SCPI

SILANEAL®
keeps brick clean

Dow Corning

Circle Service No. 27

...Silaneal keeps brick beautiful!

Structural Strength Affected?

No! And Silaneal is the *only* brick treating material proved safe in both field construction and SCPRF-prescribed wall tests. Photo at right shows wall test unit at work. These tests have proved that treating the bedding surfaces of brick with suction rates above 20 grams per minute improves wall strength, reduces rain penetration, and eliminates the need for wetting brick before lay-up.

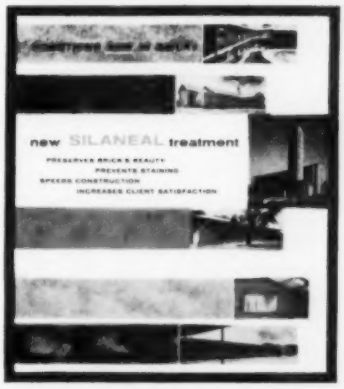
Do ALL Brick Need Silaneal?

In accordance with the recommendations of the SCPI, brick having an initial rate of absorption or suction greater than 20 grams per minute should have the suction reduced to 20 grams or less for maximum bond strength and minimum water penetration. Brick with a suction above 20 grams should have *all* surfaces treated with Silaneal. Brick having a suction *below* 20 grams should be treated on exposed faces but not on *bedding* surfaces.

Some low suction brick do not need Silaneal. Dow Corning repeatedly reminds architects and specification writers of this fact, with this statement: "There are several brick manufacturers who produce brick having low suction which already perform similar to a Silaneal treated brick. Little improvement in efflorescence control and reduction in dirt pickup could be accomplished by treating this type of brick with Silaneal. Silaneal treatment would not improve the laying properties of this type of brick."

Here's How Dow Corning Is Building Demand For Brick Treated With Silaneal

An industry-wide advertising and sales promotion program is carrying the Silaneal story to architects, builders, contractors and owners through a continuing series of big 2-page color advertisements in such leading publications as *Architectural Record*, *Progressive Architecture*, and *Building Construction Illustrated*.



Special sales aids for you: A full color descriptive movie is available at no charge for showing to your own personnel and prospects. Imprinted Silaneal literature and mailing pieces, and special "tell 'n sell" identification stickers for your sample panels and letterheads round out a promotion program that's creating a great and growing demand for *your* brick treated with Silaneal.

Get full information about Silaneal now. Phone or write today.

CORPORATION MIDLAND, MICHIGAN

branches: ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

New "Brick Pak" Wire Strapping

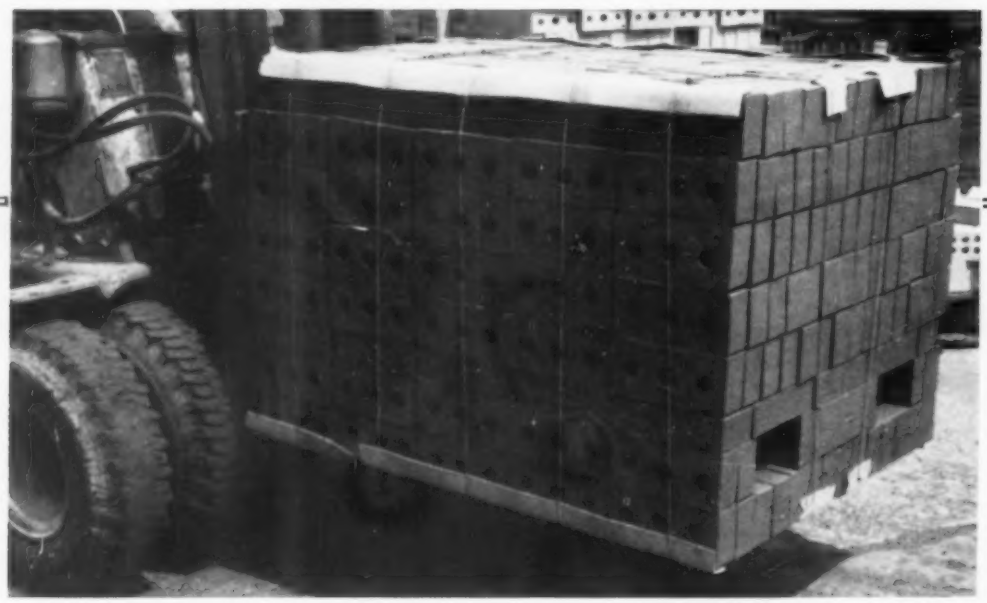
Guaranteed

NON-STRETCH

25-40% COST SAVINGS

No Rust . . . No Stretch . . .

No Shear . . . No Tear . . .



Available: A completely automatic tying system—hand tools and semi-automatic machines—hacking jigs and components for cubing.

ENGINEERING SERVICE

by experts who know and understand Brick Packaging problems.

GRIPLOCK

DIVISION

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Circle Service No. 28

MATERIALS & EQUIPMENT IN THE NEWS

Direct-Reading Dilatometer

A unique new design for a direct-reading dilatometer has been perfected by this firm, and the apparatus is now available. Specifically designed for the use of ceramic engineers, the dilatometer provides readings directly in actual percent linear expansion. Working with a three inch specimen the calibrated accuracy is greater than 0.04% of specimen length up to 1,000°C., and .10% of specimen length from 1,000°C to 1,500°C. The furnace is sealed for atmosphere work, and is equipped with non-metallic resistors. *Harrop Precision Furnace Co.*

Circle Service No. 91

Planetary Mixer

A new vertical planetary mixer of five-gallon capacity, introduced recently by this company, is particularly suitable for pilot plant operations in chemical processing, where contamination between batches of materials must be avoided, yet a good rate of production maintained for evaluation.

It processes between 50 to 70 lbs. of material in a single batch, the compounding being done in a stationary, jacketed container or mixing can, which can be removed for discharging and cleaning while another is substituted in its place, to minimize production downtime.

Actual mixing is accomplished by double planetary motion of the machine's two stainless steel agitator blades, operating at a differential speed of 2:1. *Baker Perkins Inc.*

Circle Service No. 92

Vibrating Conveyor

This firm announces a new totally enclosed air-powered vibrating conveyor, that eliminates contamination and dust when moving bulk materials.

Conveyors up to 20 feet in length may be powered by a single unit. Longer units are possible by telescoping individual conveyors in a series. This unit is three feet long and has a six inch diameter conveyor tube. This vibrating conveyor operates on 10 to 100 lbs of air pressure. The one moving part, a piston inside the cylinder, is automatically lubricated. The company states that because these air-powered vibrators use no motors, eccentric, belts, bearings, gears, or spiral screws, maintenance is reduced to a minimum. *Cleveland Vibrator Co.*

Circle Service No. 93

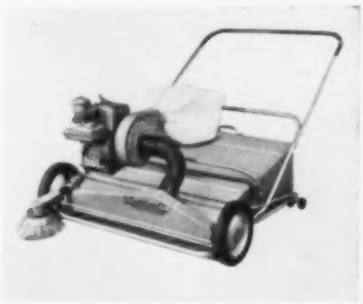
Bucket Elevators

This firm has announced a complete line of materials handling equipment for the industry. Included in this line are bucket elevators. These bucket elevators are available in many sizes and types. The different types available include type B, which is a centrifugal discharge type with a fixed head shaft, and an adjustable boot shaft. Buckets are of iron or steel, and are chain mounted. Gravity take-ups are available. Other types feature belt mounted buckets, fixed boot shafts and adjustable head shafts. Another style bucket elevator is the positive discharge type, which is also available with all of the above options. *J. B. Ehrsam & Sons Manufacturing Co.*

Circle Service No. 94

Floorsweeper

This company's new 3-D floorsweepers have an exclusive floating floor seal which provides effective control of the finest dust. Hand sweeping chores are completely eliminated. Highly maneuverable, these new sweepers clean corners and crowded areas as easily as open spaces.



Ruggedly built for the most difficult sweeping jobs, the sweepers are priced for real economy. *Lambert Inc.*

Circle Service No. 95

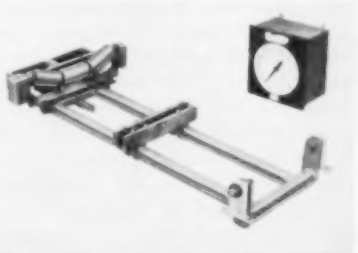
Portable Hydraulic Lift

A portable hydraulic work-load lift is now being marketed by this firm. The hydraulic system is powered by a gasoline engine and is capable of raising 1,000 lbs to a height of 17 feet. Other sizes and models are available with varying height and weight capacities. Several power options are also available and the lifts can be mounted on casters or skids as well as pneumatics. *Witch Marketing Co.*

Circle Service No. 96

Conveyor Scale

A new conveyor scale which automatically weighs, measures, meters



and/or controls the flow of bulk materials on conveyor belts has recently been introduced by this company.

(*Continued on page* 26)

(*Continued from page* 25)

Called the Vey-R-Weigh, it is designed for control applications in any operation where any type of bulk materials is transported on any type of conveyor gallery. The unit is adaptable to many measurement, control and recording operations such as a continuous product inventory, rationing or blending of additives, segregation control, bulky destiny determination, grade or assay determination of the control of feed rates to processing equipment.

Various types of controls can be provided for remote recording by tape or punchcard readout. *Ramsey Engineering Co.*

Circle Service No. 97

Portable Drill

The new Minuteman portable drill announced by this company is a compact, multi-purpose, rotary unit designed for subsurface exploration and production drilling in soils, rock and concrete.

The Minuteman weighs only 150 lbs., yet features a 6 HP, eight speed automotive transmission, diaphragm-type carburetor for drilling at any angle, 44″ stroke with power or hand feed both in and out of the hole, wheel mounted base for easier handling and two point anchoring for maximum stabilization in soils, rock or concrete. Although designed for one man portability, the Minuteman may be adapted for truck or trailer mounting as well. *Mobile Drilling Inc.*

Circle Service No. 98

Heavy Duty Truck

Engineered exclusively for heavy duty operation, this White construction Model 9064, with an eight cubic yard aluminum body and payload capacity of 30,000 lbs, has been announced by this company.

Powered by the White Mustang 462A engine developing 172 HP at 3200 RPM, this unit, with a wheelbase of 158″ and C.A. of 96″, has a 507B selective type five-speed forward main transmission with a 731D three-speed forward auxiliary transmission; a SLHD tandem drive single reduction rear axle and a 116DX front axle. The frame is a double channel of chrome manganese steel, heat treated. *The White Motor Co.*

Circle Service No. 99

Pipe and Tile Tester

Announcement of a new Model PT-75 heavy duty pipe and tile tester designed to accommodate specimens up to 84″ I.D. in lengths up to 8′, has been made by this firm.

Maximum pressure is 150,000 lbs., and the tester is equipped with two load indicators 0 to 30,000 lbs for smaller pipe and 0 to 150,000 lbs. for large pipe. Both manual and electrically operated pumps are provided.

The same type machine is available for loads up to 500,000 lbs., and to accommodate pipe up to 12′ I.D. in lengths to 16′. *Forney Inc.*

Circle Service No. 100

Nylon Belting

A significant advance in materials handling through the use of oriented nylon strip both to strengthen conveyor belting and greatly extend its life has been announced recently.

Key to the exceptional performance of the new belt is said to be a core layer of nylon strip which has been oriented to give it exceptional tensile strength and minimum residual elongation or "stretchability". *Goodall Rubber Co.*

Circle Service No. 101

New Literature

Metering and Control—A new eight-page illustrated brochure (Bulletin 600) describing metering and control instruments for rotary kilns and associated equipment is now available. Illustrations of applications and components are included along with descriptions and diagrams of modern kilns, mills and coolers. Also included are record charts which compare percent oxygen and percent combustibles for various types of kiln operation. *Bailey Meter Co.*

Circle Service No. 102

Vibrators—A new, illustrated six-page brochure describing their complete line of Unit (Bin) Vibrators is being offered by this firm to handlers of all types of bulk materials. *Eriez Manufacturing Co.*

Circle Service No. 103

Silicones—An up-to-the-minute summary of the forms, properties and applications of this firm's silicones is contained in this free, 16-page brochure. Extensively illustrated with photographs, tables and graphs, this engineering guide to silicone products contains valuable data you will want readily available at your fingertips. *Dow Corning Corp.*

Circle Service No. 104

Helpful Ideas—Ready for a new building? If you are, a new free booklet entitled "Seven Money Saving Ideas from Stran-Steel" will provide you with many helpful suggestions. The booklet discusses items that should be considered before the plans are drawn. Some of these points could be easily overlooked, and result in a building of higher cost, lower efficiency, and lower resale value. *Stran-Steel Corp.*

Circle Service No. 105

Combustion Equipment—A new condensed catalog of gas-combustion and control equipment for the industry has been released. The eight-page catalog, which can be put into a binder for convenience, folds out with all burners and mixers on one face and blowers and accessory items on the back. *Bryant Industrial Products Corp.*

Circle Service No. 106

Twin-tunnel dryers and kilns . . . by Harrop . . . typical of the 12 Harrop installations for A. P. Green Fire Brick Co., Mexico, Missouri, and its subsidiaries.

A. P. GREEN dries and fires in 12 Harrop tunnel dryers and kilns...

First Harrop unit for A. P. Green was installed in 1925. In the years that have followed, among all A. P. Green installations a total of 12 kilns and 12 dryers have been installed by Harrop for A. P. Green Fire Brick Co., its Valentine Fire Brick Co. Division, and Keramos, S. A., an affiliated company. And a number of other kinds of jobs have come to Harrop from Green in those same years.

Such repeat buying over so many years is an expression of confidence in Harrop design and installation . . . a confidence earned 22 times over as Harrop has carried out 22 different assignments for Green.

You, too, can expect to have Harrop earn your confidence when you come to Harrop with your problem. When it's a matter of the drying and firing of ceramics, Harrop has the answers, in which you can place your confidence. For complete information, write us today.

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TUNNEL KILNS ■ DRYERS ■ PLANT DESIGN

Circle Service No. 29

"PYRAX" PYROPHYLLITE

FOR REFRACTORIES

Three special grades of "PYRAX" pyrophyllite have been developed for use in refractories.

Refractory grades of "PYRAX" pyrophyllite can be used to good advantage in refractory brick, refractory cements, unfired refractories, backwalls, radiants, tile setters, saggers, and other special refractories.

"PYRAX" pyrophyllite has a P.C.E. of cone 26 to 27 and where mixed with small amounts of kyanite its P.C.E. can be increased to cone 28 or 29.

"PYRAX" pyrophyllite refractories when properly compounded have a high strength, will not spall or fail due to temperature gradient.

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What Makes a Business Big?

There are many activities which make a business big. One of the most important is research. As another year rolls around it probably is in order to take a look at heavy clay products and the research backing those products.

We have in the heavy clay products industry three research groups. These three research groups put the heavy clay products industry high up on the list of industries sponsoring research. The Structural Clay Products Research Foundation supports building products; the National Clay Pipe Research, Inc., aids the clay pipe industry, and some work sponsored by the Refractories Institute at Mellon Institute backs the refractories manufacturers.

Besides industry supported research projects, there is considerable research in progress at most of the progressive manufacturing plants in all three branches of the heavy clay products industry.

Are the research programs accomplishing enough for the industries? Are they big enough? Are we serious enough about research to give it a fair trial? For instance, duPont spent $27 million in a 12 year period on nylon research before full-scale commercial production was started. Not only does research take a large amount of money and a long period of experimentation, but the risks are great, as only about one out of every twenty research projects is successful.

The point, is however, if we are thinking big enough in our research, will our patience last ten years and our backing hold up during the waiting period? Are we convinced that one out of twenty is a good average for success?

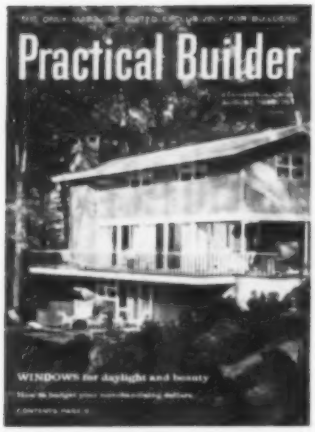
We must be aware of the facts and back our research projects if we are to be counted among the successful industries.

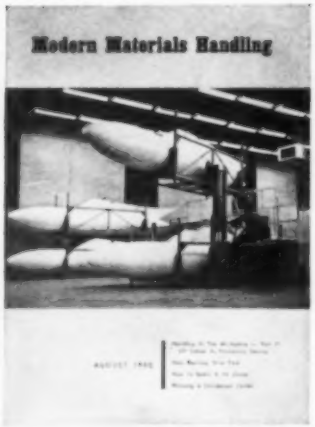
How long will it be before our industries have slogans like those we frequently see?

"Progress Is Our Most Important Product"
"Progress Through Research"
"Finer Products Through Imagination"
"Better Things for Better Living—Through Chemistry"
"A Symbol of Modern Living Is A Product of Corning Research"
"Advanced Appliances Designed with You In Mind"

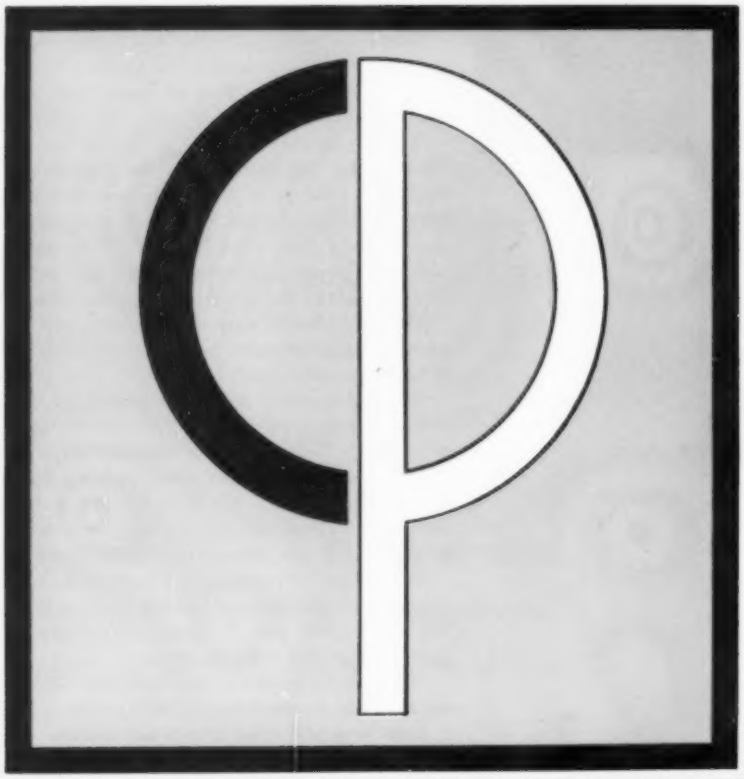
J. J. Shea

Executive Editor

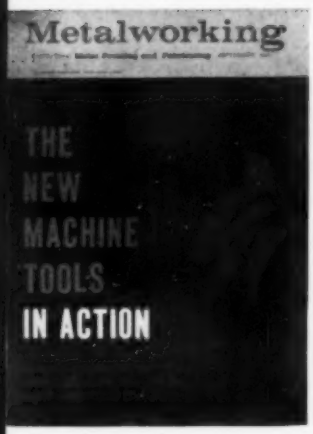


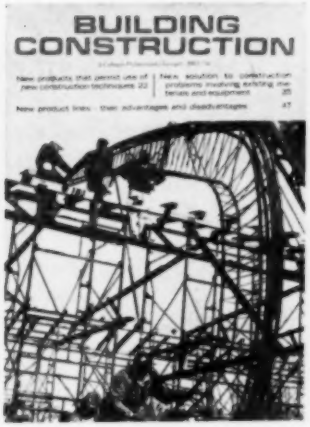


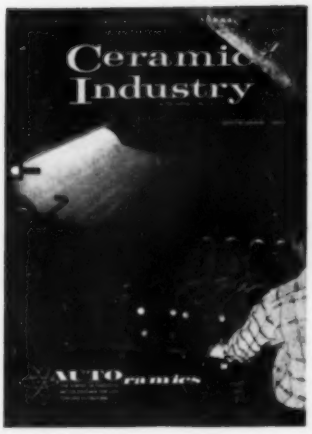
SYMBOL OF SERVICE



CAHNERS PUBLISHING







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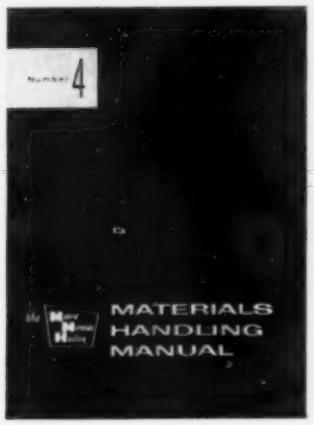

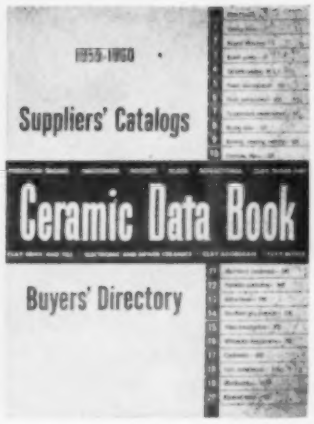

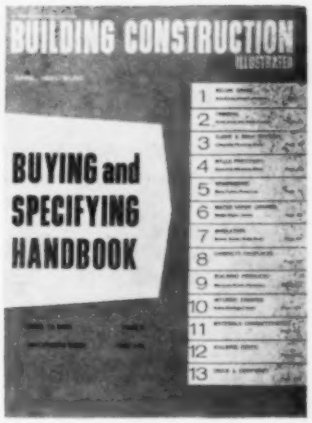

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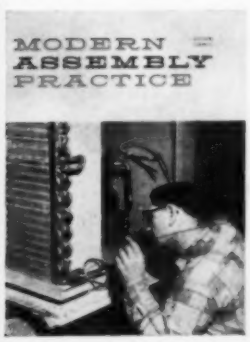
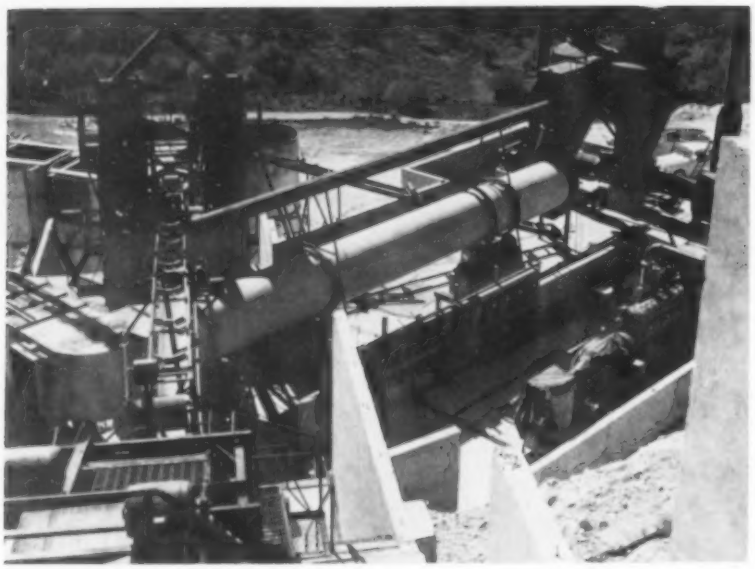


NEWS OF THE INDUSTRY

New Perlite Plant In Idaho



Installation of the latest equipment for Perlite mining at Oneida Perlite Corp.'s mine at Malad City, Ida. Assures this high grade mineral will be of consistant high quality and uniform to any manufacturing specification.

A successful $345,000.00 stock offering recently completed by Oneida Perlite Corporation of Malad City, Ida., assures the Intermountain West and our nation of a promising new industry.

Elected Officers of the corporation are Marion J. Hess, President; Udell Champneys, Vice-President; Paul Mills, Secretary-Treasurer; Loyal Lewis, Director; and Rosell Mills, Director; all of Malad City. Products will be sold under the name of Perlcor.

First shipments of perlite ore were to be made by the first of November. Shipping at the rate of 5000 tons a month (one hundred railroad cars per month.) Oneida Perlite officials plan to be in business for at least another 500 years!

Marion J. Hess, president of Oneida Perlite Corporation, announced that the company will furnish raw perlite ore to the Intermountain region, and nation.

Perlite is a volcanic ore composed of silica and aluminum. When heated quickly in its raw stage, to above 1200 degrees Fahrenheit, it expands or "pops" to form lightweight, noncombustible glass-like particles which have a variety of uses.

Oneida Perlite Corporation has the mineral rights for two complete ranges of mountains in Oneida County, Idaho. The deposits, 25 miles from Malad City, contain every type of Perlite, most of it is 98 percent pure ore. Nationally known geologists have flown to the perlite area and surveyed the extent and quality of the ore deposits. Their reports show the Oneida Perlite Corporation holdings could be the largest and perhaps the best in the world.

Brick Plant Featured In Manufacturer's Magazine

The Lee Brick & Tile Co., Sanford, N. C. was recently featured in a two-page article in "The Marion Groundhog", a sales promotion magazine published by the Marion Power Shovel Co., Marion, O. The editors of Brick and Clay Record are naturally pleased that the brick industry is being recognized as a big user of power construction equipment and our congratulations go to Hugh Perry, general manager of Lee Brick & Tile Co.

White-Burning Clay Deposit In Wyoming

A major new deposit of brick clay has been opened 15 miles northwest of Evanston, Wyo., providing the Intermountain Area with its first raw materials source for production of a white brick.

Such brick had heretofore not been produced in the area.

Three firms, Interstate Brick Co., Gladding McBean Co. subsidiaries, both of Salt Lake City, U., and Harrisville Brick Co., Ogden, U., own claims in the new deposit. All three are now producing the brick from the Wyoming clays. Utah Fire Clay Co. and Murray Refractories are the Gladding-McBean firms.

Stark Offers Prizes For Ideas On Sculptured Tile

A trip for two people to Paris and Rome is the first prize in a contest that is being conducted by Stark Ceramics, Inc., Canton, O., for architects and contractors. There are 12 other prizes, and duplicate prizes will be awarded to Stark distributor salesmen who are responsible for sending in the winning entries.

Purpose of the contest is to find the most original, interesting and practical uses for Stark's Sculptured Tile, a structural glazed tile which offer a new dimension of light and shadow, texture, and contrasts in shape and color.

The contest closes March 31 and will be judged by two architects and a contractor in Cleveland, O.

Three Companies Join Shale Institute

The Expanded Shale, Clay & Slate Institute has welcomed three new members into their association. They are: Shale-Lite Corp., Irwindale, Calif.; Treasurelite Div. of Treasure State Industrial Products, Inc., Great Falls, Mont.; and Reids' Lightweight Aggregate Pty., Ltd., North Essendon, Victoria, Australia. The association maintains headquarters in Washington, D. C.

Announce Discussion Panels for B&CR Clay Block Conference

Plans are progressing for the Clay Block Conference which will be sponsored by BRICK & CLAY RECORD at the Palmer House in Chicago on March 23 and 24, 1961. Panels are now being formed and are now partially completed. Expectations are that the panels will be completed by February 1.

Dr. G. C. Robinson, Clemson College, will be Chairman of the panel which will discuss Types of Aggregate to use in making the clay block. Robert Taylor, SCPRF has agreed to serve on the panel as has R. G. Hardy, President of the Expanded Clay & Shale Association. Personnel with other aggregate interests have been requested to serve on the panels and it is expected that they will also be available to answer any questions from the audience.

Dr. William C. Bell, North Carolina State College will head the discussion on "Forming Clay Block". Panel members representing machinery manufacturers have been invited and those already accepting the invitation to participate include, Robert F. Poole, Chisholm, Boyd & White; Karl Nensewitz, Besser Company; L. Arthur Lassman, Benjamin Lasson & Sons. Representatives of other machinery manufacturers whose equipment is used in molding the block are also expected to attend.

L. B. Coffin, of Alfred University will discuss "Implications of Roller Hearth Kilns", heading the panel on "Firing Clay Block". Representatives from Miller Equipment Co., Swindell-Dressler Corp., Ohio Kilns, Inc. have promised to serve as panel members and it is hoped that representatives from other people with experience in firing the block will attend the meeting.

Dr. J. F. McMahon, Alfred University will head the panel which will discuss the glazing of the block and the uses of clay block. Mr. Joshua Lowenfish, Chief, Architectural Research, New York State Division of Housing will be on hand to serve on this panel. Mr. Lowenfish is an architect and was instrumental in having Alfred University prepare lightweight glazed block for one of the low-cost housing units in New York City. Mr. George Pixley, Pelm Research & Development Corp., Newburgh, N. Y. has also consented to serving on the panel. Mr. Pixley also worked with Alfred University in the development of the block and represents a consulting firm which interests itself in the erection of plants for the manufacture of lightweight block. The editors of Brick & Clay Record are also trying to obtain members from the industry with experience on this subject and we are trying to obtain personnel from Cleveland Builders Supply Co. in Cleveland, Ohio.

In addition to the above panels, a panel of architects and contractors will discuss the design and use of clay-bonded block. Also, motion pictures on the manufacture of a foreign clay-bonded block will be available for showing by Louis Garlone, Kelsey-Ferguson Brick Co., East Windsor Hills, Conn.

Reservation cards will be mailed to all members of the industry shortly. Keep March 23 & 24 open so you can make plans to attend the meeting. It will be an open-type of meeting with "no-holds barred", with the ultimate purpose of informing everyone on "How To Get In The Block Business".

Three Promoted At Metropolitan Brick

Shown are the three men who were recently promoted at the Darlington, Pa., plant of the Metropolitan Brick, Inc., (Left to Right) W. J. Pfingsten, assistant production manager; Frank Reed, plant superintendent; and Bob Reeves, assistant superintendent.

Personnel promotions at the Darlington Pa., plant of Metropolitan Brick, Inc., of Canton, O., have been announced by Ralph G. Sterling, vice president in charge of production.

W. J. Pfingsten becomes assistant production manager for all Metropolitan plants. He previously was plant superintendent at Darlington. Pfingsten joined Metropolitan in 1949 and was at the Minerva plant until 1951, when he became assistant superintendent at Darlington.

Frank Reed succeeds Pfingsten as plant superintendent at Darlington. He joined Metropolitan in 1948, advanced to Foreman in 1951 and became assistant superintendent in 1956.

Bob Reeves, who has been associated with Metropolitan since 1957, now is assistant superintendent at Darlington, where production is centered on ceramic glazed brick.

In addition to Darlington, Metropolitan operates plants at Bessemer, Pa., and in Negley, Minerva and Canton, O.

1961 Outlook Good For Residential Building

New residential construction is verging on an upsurge, in the opinion of Goodbody & Co., New York City, N. Y. This is the conclusion of a detailed study of the residential building outlook just published in the firm's January 1961 Monthly Market Letter. Among the important factors discussed in the Letter are family formations, greater availability of mortgage funds, reduced interest

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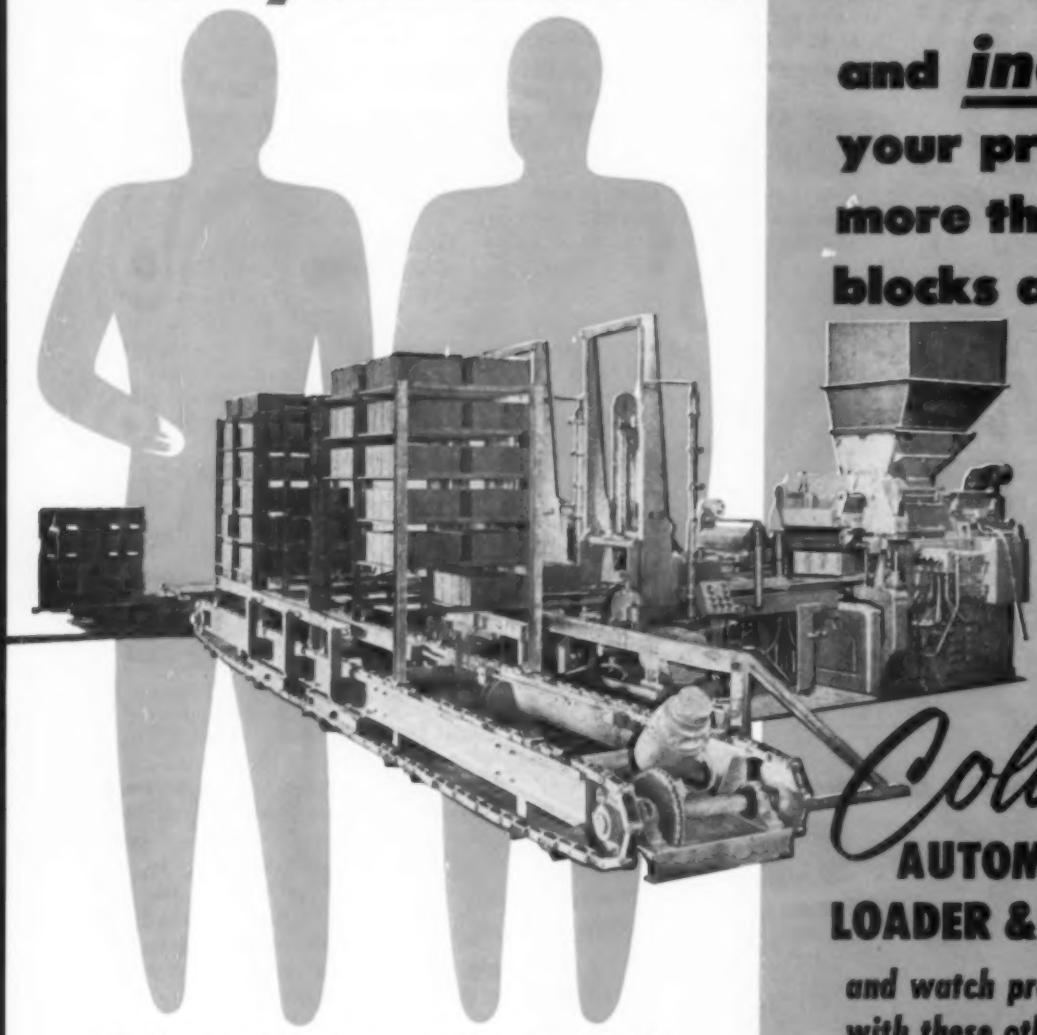

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N C M A Convention, Detroit, Jan. 30-Feb. 2. Visit us at the Detroit-Leland, Silver Room.

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For complete information call your Columbia representative or write, wire or phone.

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Manufacturers and world-wide distributors of a complete line of plant equipment for production of concrete products

rates, lower down payments, longer mortgage maturities, and an increasing upper-age population, which tends to maintain separate households instead of doubling up with the younger generation as in the past.

The Goodbody Letter expresses the opinion that building stocks could outperform the general market over the next two years. It recommends the stocks of seven leading manufacturers of building materials and presents background and statistical information on each.

Ceramic Engineering Award Announced

The third annual award program, established to honor the nation's outstanding young ceramic engineer was announced today, December 1 by E. C. Henry, President of the National Institute of Ceramic Engineers. Each year one young man, whose achievements have been significant to his profession and also to the general welfare of the people, will receive an award honoring him for his Professional Achievement in Ceramic Engineering.

The 1960 PACE Award, sponsored by the National Institute of Ceramic Engineers, will be presented at the next annual meeting of the National Institute of Ceramic Engineers, held in Toronto, Ont., on April 23, 1960.

The purpose of the PACE Award program is to focus public attention on the oustanding achievements of the young men of America's ceramic industry and to illustrate the unparalleled opportunities available in the ceramic engineering progression.

Nominations are open to all branches of the ceramic industry. Any individual or group may enter one or more nominees. Any young man or woman, 21 through 40 years of age, who has not reached his 41st birthday during 1960, may be placed in nomination.

Nomination blanks shall be available through the PACE Award Committee, The National Institute of Ceramic Engineers, 4055 North High Street, Columbus 14, O.

Lightweight Aggregate Meeting Announced

The Annual Meeting of the Expanded Clay & Shale Association will be held in the Sheraton-Jefferson Hotel, St. Louis, Mo. on February 23 and 24, 1961. The association has been assured of good accomodations at the hotel and plans for an interesting agenda are being formulated.

Two New Tunnel Kilns At Rockford B & T

With the completion of two new Ohio tunnel kilns at Rockford Brick & Tile Co., Rockford, Ia., the company has completed the first phases of its modernization and improvement program. The two kilns are each 195-ft. long and are equipped with in-line preheaters, each 41-ft. long.

Both tunnel kilns are equipped with propane stand-by equipment to make the changeover from natural gas easy and quick.

Robinson Brick & Tile Opens New Sales Office

The Robinson Brick & Tile Co., Denver, Colo. recently announced establishment of company-operated distribution and sales offices in Salt Lake City, U., headed by Richard A. Ridges.

C. L. Fraker, Denver sales manager of the firm's tile division, said Robinson heretofore had always operated through independent dealers.

Isenhour Assumes Chairmanship

C. W. Isenhour, Jr., Isenhour Brick Co., Salisbury, N. C. recently assumed chairmanship of the Southeast Section of the American Ceramic Society at the fall meeting held in Chattanooga, Tenn. W. Harry Vaughn, Cherokee Brick Co., Macon, Ga. was the outgoing chairman.

Technical sessions of the program included a talk by Scroop W. Enloe, Jr. of Harris Clay Co., Spruce Pine, N. C. He talked on "Need For Ceramic Engineers in the Growing Southeast". After his talk, Enloe received the Hewitt Wilson Award for meritorious service in the field of ceramics.

Other officers selected at the meeting included Harold Bishop, Statesville, N. C., vice-chairman, and Dr. Willis Moody, of Georgia Tech in Atlanta, treasurer. W. F. Torreyson of Atlanta was elected chairman-elect.

Britain Needs Brick But, Oh, That Singing!!

Booming Britain, putting up 300,000 houses a year and almost all of them in brick badly needs brick. An order given to a brickyard next week might not be filled until late 1961 or even till 1962.

Forty per cent of all that nation's brick are made from a strip of clay running through Bedford. The clay contains enough petroleum to make the brick almost self-burning.

The yards could put out another million and a half brick per week if they could get extra labor. In the early post-war years the yards used German prisoners of war as labor.

When the Germans were freed and sent home, the brick yards recruited men from southern Italy. In five

years 6,000 Italians came, including wives and children.

Then with the immigrants making up one-tenth of the Bedford population and brick were temporary surplus, recruiting was stopped.

Now the yards have recruited 500 more Italians, of whom 200 are packed and ready to come. But the Bedford town council appealed to the ministry of labor to keep them out.

The case against the Italians was argued recently in the town council by the mayor, Alan Randall.

"We have nothing against Italians as Italians", he said. "We have assimilated those who came earlier and overcome crowded housing, but . . . ."

But what?

Well, the mayor went on, Italians go to work early in the brickyards, about 6:30 A.M. They walk to work and as they walk, they sing. They sing loudly. The Bedford Englishman, the mayor said, is irked. He wants another hour in bed.

Pierce New United General Manager

The appointment of Millard O. Pierce as general manager of its United Brick & Tile Division, Kansas City, Kan., has just been announced by the American-Marietta Company, Chicago, Ill. Pierce succeeds Parnell Mahoney who will remain with United in an advisory capacity.

The increasing demands of Mahoney's business interest, principally centered in Iowa, were the reason for his decision to relinquish general management in which capacity United has been served since 1928 by his father, D. P. Mahoney and himself.

New general manager of this American-Marietta Division, Millard O. Pierce, has been a staff executive of A-M's Concrete Products Division which has its main office in Chicago. Before joining A-M in 1955, he was associated with Universal Concrete Pipe Co., Columbus, O. Pierce assumed responsibility for all United Brick & Tile operations on December 1, 1960.

Expansion Program Slated For Canadian Plant

A $160,000 modification and expansion program will start early next year at the Saskatchewan Clay Products plant in Estevan, Sask. Announcement of the program was made recently by J. H. Brockelbank, chairman of the board of directors of Saskatchewan Minerals.

The expansion program, when combined with the recent discovery of new clay products, will make it possible to produce additional colors and types of brick. The program, when completed, will incorporate the latest technical advances in drying and firing facilities and will increase the plant's capacity by 10 per cent.

Work on the program is expected to begin early in January and is scheduled for completion within three months.

Dressler To Build Australian Brick Plant

Swindell-Dressler Corp. has been awarded a $2,500,000 contract by Brickworks Limited of Sydney, Australia. The Pittsburgh, Pa. firm will design, engineer, manage and supervise construction of the modern building-brick plant near Sydney.

The plant's capacity will be 41,600,000 Australian bricks per year. This is comparable to 83,200,000 brick of United States standard size. Daily production will be 114,300 brick.

The new plant will produce brick

(Continued on page 38)

Acme Installs New Communications Center

One of the most advanced instantaneous communications networks in the nation has been put into service by Acme Brick Co., Fort Worth, Tex.

The new system can speed messages more than 3000 miles in minutes over an ultra-modern teletypewriter network that now links Acme's 19 plants and 30 sales offices. Neill Boldrick, Acme President, made the announcement of the new equipment, which was custom-designed and installed for Acme by Bell Systems Long Lines Department.

Boldrick pointed out that the new system will enable the company to keep all points in their system in continuous contact, thus improving customer service. Orders can be transmitted at 60 words a minute from sales offices to manufacturing plants. The same speed is used to dispatch trucks and to schedule rail shipments. Questions with homebuilders and contractors are settled almost as fast as they are asked.

Besides speeding customer orders and inquiries, the teletypewriter hookup keeps internal data flowing smoothly. Approximately 30,000 words a day between the 44 stations will go over two high-speed circuits radiating from general offices in Fort Worth. Acme personnel will operate the service without telephone company assistance.

Acme operates plants throughout Texas, Oklahoma, Kansas, Arkansas and Louisiana.

Neill Boldrick, seated, president of Acme Brick Co., Fort Worth, Tex., discusses Acme's new teletypewriter system with Gail Hamby, Acme operator.

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WELLSVILLE FIRE BRICK
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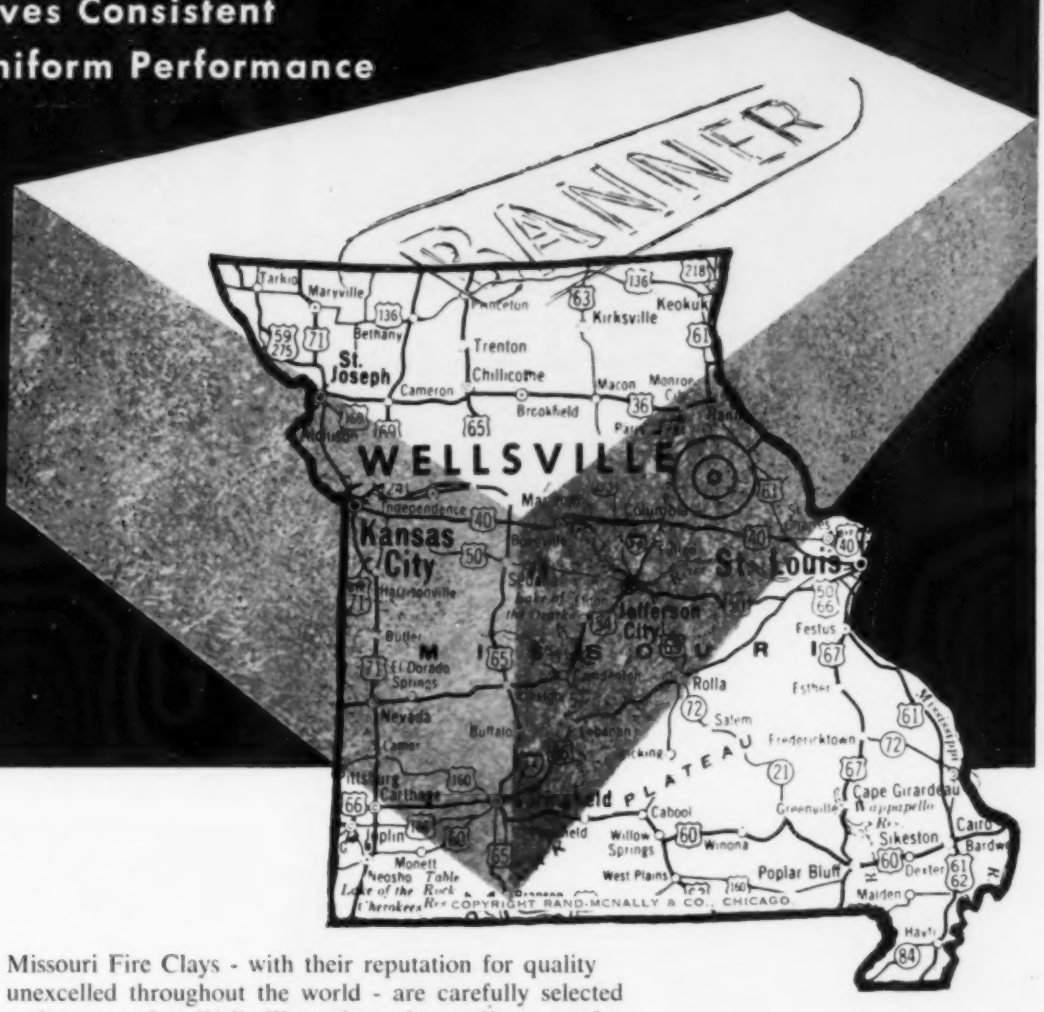

Missouri Fire Clays - with their reputation for quality unexcelled throughout the world - are carefully selected and processed at Wellsville under strict quality controls to serve you with a truly superior refractory.

With a more than adequate source of these fine clays to back up a heavy investment in new facilities, in electronic controls, and in constant research, Wellsville produces several million brick a year - all with consistently uniform quality.

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WELLSVILLE Fire Brick COMPANY – WELLSVILLE, MISSOURI

Local representatives throughout the nation to better serve you.

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(*Continued from page 36*)
formed by the stiff-mud extrusion process. It will be the first of its kind in Australia based on American principles of brick manufacturing.

Equipment will feature two Dressler tunnel kilns, each 549 feet long—believed to be the longest ever built. There will also be two Dressler-Robinson four-track dryers, each 163 feet long. Additional equipment will consist of mixers, roll crushers, extruders and smaller processing units.

Swindell-Dressler personnel will be stationed in Sydney to manage and supervise construction which is planned for completion in October.

Research In Brick Stressed By Brownell

Dr. Wayne Brownell, professor of research at Alfred University, recently told a joint meeting of faculties of Alfred Univ. and the state Univ. of Agricultural and Technical Institute that research is just beginning to take hold in the brick industry.

The industry has become interested in research because of competition and the demands of architects and customers in modern society, Brownell said. Competition has forced the industry to seek ways to reduce labor costs in brick production and also reduce the amount of losses while at the same time seek a higher quality product. Research on the product has enabled manufacturers to produce blends of shades and textures and maintain close control over size and shape.

Dickey Dedicates New Birmingham-Bessemer Plant

Dedication ceremonies on Dec. 8 marked the formal opening of the W. S. Dickey Mfg. Co.'s new 5.4 million dollar ultra-modern Birmingham-Bessemer plant in Bessemer, Ala.

One of seven Dickey plants, the new facility is part of a long range modernization and expansion program intended to meet the increasing demand for clay products in the Southeast.

With an initial rated capacity of 55,000 tons of pipe per year, the new plant will manufacture a complete line of clay pipe in 4-in. through 36-in. diameters, Dickey couplings, flue lining, wall coping and related clay products. The 820-foot, two unit plant contains 254,000 square feet of manufacturing space and includes a clay storage building with a capacity of 20,000 tons.

Completion and dedication of the Bessemer plant climaxes the celebration of the W. S. Dickey Clay Mfg. Co.'s Diamond Jubilee year. The full report on the 75th anniversary was described in the September issue of Brick & Clay Record.

Hon. Jess Lanier, Mayor of Bessemer, Ala. prepares to cut ribbon to new Dickey plant as Thos. Howard, Plant Manager (left), Geo. Rust, Rust Engineering Co., Birmingham, Mrs. A. C. Dauwalter (in whose husband's name, the plant was dedicated), Hans Wilhelmson, Dickey Pres., and J. W. McCrosky, plant superintendent look on.

OBITUARIES

Albert B. Cooper

Albert Bray Cooper, 79, of Winslow, Wash., died Dec. 19, 1961 at his home. A well known former resident of Uhrichville, O., he was associated with his father in the old Diamond Sewer Pipe plant for many years.

C. A. Boren, Jr.

Cecil Addison Boren Jr. of Pleasant Garden, N. C., vice president and general manager of the Boren Clay Products Co., of which he was a founder, died recently.

Franz Olbrich

Franz Olbrich, 74, founder and owner of the Columbia Brick Works, Gresham, Ore., died in Portland, Ore., December 6.

Olbrich, known as the "father of Roman brick" had operated his plant for 50 years. His firm at one time made more than 150 different kinds of brick.

Born in Germany, Olbrich traveled to Oregon in 1906 and with two uncles established the brick works of which he remained president for 25 years.

Thomas J. Myers

Thomas J. Myers, 71, of Toronto, O., died December 7. A former vice president of Union Clay Mfgr. Co., Empire, O., Myers was with the company until the disposal of its interests in 1946.

Gordon Ames, Sr.

Gordon Ames, Sr., 86, a retired brick manufacturer from Fredonia, Kan., died in a Dallas, Tex. hospital recently.

A native of Minn., he had been engaged in the manufacturing of brick in Fredonia since his graduation from college in 1904 till his retirement at the age of 80.

Higher output on FINE GRINDING..20 to 400 mesh.. with WILLIAMS ROLLER MILLS

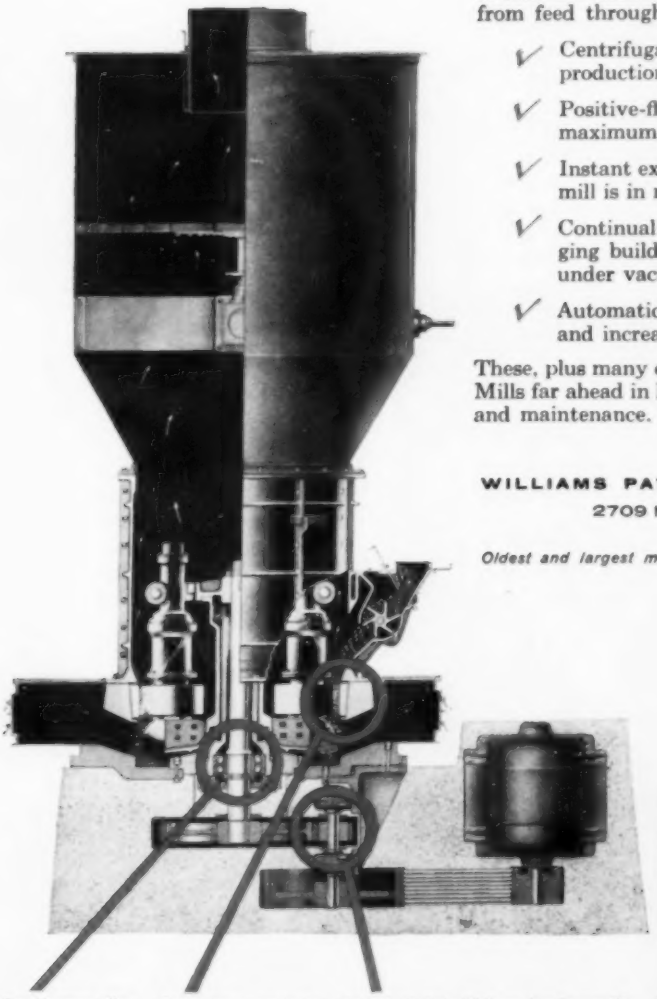
A Williams does the entire job in a single continuous operation—from feed through grinding, blending, drying and classifying!

- ✓ Centrifugal grinding roll action against bull ring keeps production high—automatically compensates for wear
- ✓ Positive-flow feed control is self-adjusting—maintains maximum capacity of mill
- ✓ Instant external fineness adjustment can be made while mill is in motion
- ✓ Continual upward air sweep to classifier prevents clogging build-up of finely ground material. Mill operates under vacuum to insure dustless operation.
- ✓ Automatically controlled hot air is available for drying and increased output of moist material.

These, plus many other advanced features keep Williams Roller Mills far ahead in higher production, lower costs. less downtime and maintenance. *Write for catalog.*

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
2709 N. Broadway • St. Louis 6, Mo.

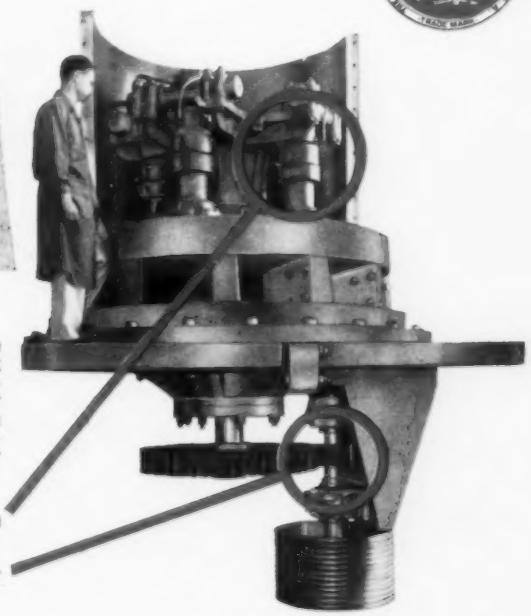
Oldest and largest manufacturers of hammer mills in the world



Troublesome alignment is greatly simplified and far less frequent with only 2 bearings on main shaft; the bottom one carrying both radial and thrust loads.

From here, material pulverized by rollers against bull ring are airlifted to classifier which passes correctly sized product and returns coarse material for regrinding.

Exclusive! Only Williams has longer-life SPUR GEAR or GEARLESS DRIVES that eliminate expensive bevel and other hard-to-maintain gears. Standard and larger models have rugged spur gear and pinion drive—smaller models have direct motor-to-shaft V-belt drive requiring no care or lubrication.



"Giant" mill with cover section off show roller journals which suspend grinding rolls on bearings sealed against dirt and grit. Note wear-resistant steel forged bull ring.

Housing is also removed to show rugged spur gear and pinion drive. Easy, quick accessibility for service is another Williams time and money-saving feature.

WILLIAMS
CRUSHERS GRINDERS SHREDDERS

Hammer Mills | Helix-Seal Mills | Air Separators | Vibrating Screens | Feeders | Impactors

Circle Service No. 32

News of Refractories

Construction Progresses At Porter Plants

The $4 million expansion program of the Refractories Division, H. K. Porter Co. is proceeding on schedule according to last reports by the company. Construction of a new mine and two new plants will be completed in the Spring of 1961.

The mine at Wellesville, O. is to be constructed near and operate in conjunction with the Wellsville plant. Two tunnel entries, driven in 250 feet, are complete and the concrete linings have been started. The daily capacity will be between 1100 and 1200 tons of clay per single shift.

Also at Wellsville, where ladle brick is the chief product, a $1½ million expansion program is underway. All structural steel buildings have been completed, one of which will house the two Swindell-Dressler tunnel kilns, each 480 feet long, over 100 feet longer than the average kiln. The two kilns, being built simultaneously, have been under construction for one month. The raw materials handling system for the Wellsville plant is nearing completion.

The expansion program now under way at the Bessemer, Ala. plant of H. K. Porter Co. includes a new manufacturing building, new equipment and an expanded product line.

All structural steel work has been completed and 25% of the new building is under roof. The building will house a tunnel kiln, 441-feet long, a 134-foot dryer and a four-car shuttle kiln for the production of special shapes and short run items. The dryer is now under construction and foundations have been laid for most of the manufacturing equipment.

All-Basic Glass Tank Installed In California

Basic refractories were used in the construction of a glass tank for the Gallo Glass Co., Modesto, Calif. The installation of this furnace was so successful that the Refractories Division of H. K. Porter Co. just received an order for a second furnace.

The Gallo furnace is the first glass tank to be constructed with a Porter patented suspended basic roof. The suspended roof uses an air cleaning and air cooling system.

In addition to the basic brick in the roof, chrome-magnesite brick were used in the lower side walls and tab brick were used in the upper side walls. High purity periclase brick were used in the checker setting.

To Manage Refractory Sales at Gladding

The appointment of Lloyd H. Paulson to the position of general sales manager, Refractories Division, Gladding McBean & Co., Los Angeles, Calif. has been announced by W. F. Godejohn, Vice President. Paulson fills the position left vacant by the recent death of Joseph R. Rhodes.

Lloyd H. Paulson

Paulson will be responsible for the over-all sales program of refractory products. Since his affiliation with the company in 1946, he has served as area sales manager in both San Francisco and Los Angeles.

Two Appointments Made At Corhart's New Plant

Two Louisville, Ky. men have been named to key positions in the plant being built at Buckhannon, W. Va. by Corhart Refractories Co., Louisville, Ky.

George Lass will be production superintendent while Donald C. Fleming will be plant industrial engineer and personnel manager. Lass has been general foreman of furnace operations of the company's Louisville plant, while Fleming has been an industrial engineer.

TRI Committees Meet

The Technical Advisory Committee of The Refractories Institute held a full two-day meeting recently with 100% attendance in Cleveland, Ohio. Annual report of the activities of this committee will be presented at the Spring Membership Meeting, June 22-23, 1961 at the Greenbriar, White Sulphur Springs, Va. L. J. Trostel is chairman of this committee.

A meeting of industrial relations directors of some of the member companies of TRI was also held recently in Pittsburgh, Pa. to draw up a program on the proper handling of employee grievances and presentations of cases before an arbitrator, to be offered at the 1961 Factory Operators Meeting.

Guidance Counselors Tour Garber Labs

Approximately 150 Pennsylvania High School guidance counselors and ceramists attended a recent meeting jointly sponsored by the Pittsburgh Section of the American Ceramic Society and Pennsylvania Ceramic Association.

Entitled "Ceramics As A Career", the program included a tour of Harbison-Walker Refractories Co.'s, Garber Research Center, displays of ceramic products manufactured in and around the Pittsburgh area by twelve companies and an address at Mellon Institute by William S. Lowe, President of A. P. Green Fire Brick Co.

Dr. Ed Ruh, Assistant Director of Research for Harbison-Walker was Master of Ceremonies at the meeting. Career opportunities in the ceramic field were discussed by Dr. George Spencer-Strong, V. Pres. of Pemco Corp., and H. P. Bonebrake, Manager of Chemical Sales for Alcoa.

Denver Fire Clay Acquires West Coast Manufacturer

Dickinson Kilns, the largest firm specializing in the manufacture of ceramic kilns on the West Coast, has been purchased for an undisclosed sum by Denver Fire Clay Co.

The acquision of the company by Denver Fire Clay will give the 85-year-old Denver Co. the West's most complete kiln line.

BOYD PRESS IS BASIC / for soaking pit refractories

MODEL Y Delivers the Density to resist impact and corrosion

It takes a *heavy duty* press to deliver the power and compaction needed to turn out refractories that will withstand the combination of destructive forces at work in a soaking pit.

The Model Y Boyd Press is designed to produce extremely dense, low porosity bricks that resist spalling, corrosion and impact to afford optimum pit life. The big 37″x21″x12″ mold cavity lets you make the *most* of higher pressures—to increase brick production; handle larger size molds, or more molds per stroke.

Why not investigate how a *step-up* to Model Y can help you produce the dense, corrosion resistant brick that your customers are *looking for* in a soaking pit refractory?

Write for details.

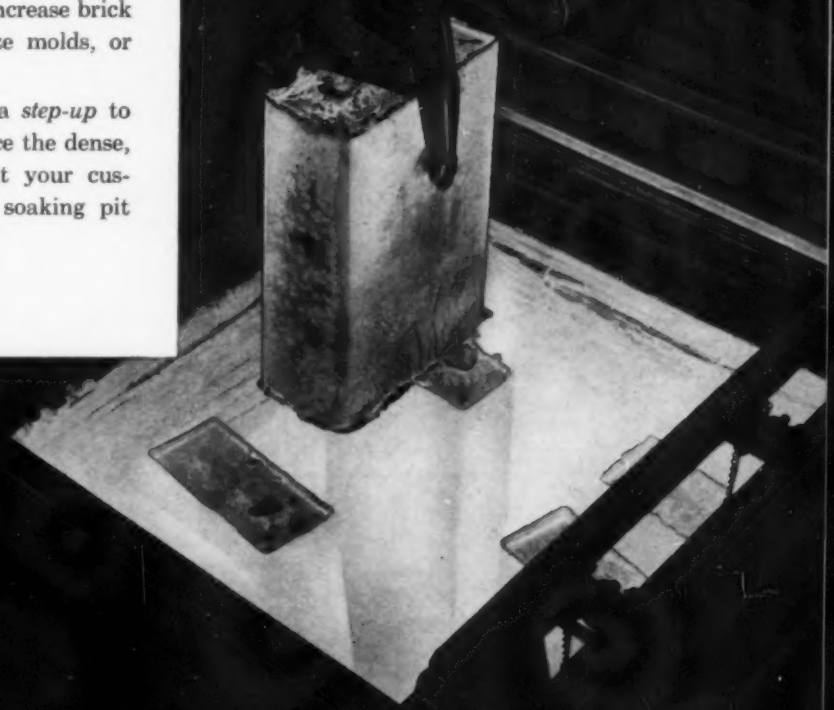
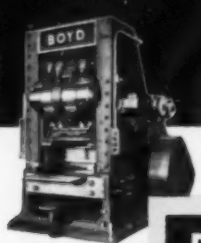


Photo courtesy of Republic Steel Corporation.



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SCPRF News

Research is very satisfied with the performance of the first panel structure. These large panels went into place without a hitch. How much more satisfaction will an architect get from his application of clay products panels? There is no shrinkage, no expansion, perfect insulation and once they are set in place and sealed, there is no chance for leaks. This can be said of a clay products panel only.

* * *

A mortar can be as strong as the brick wall itself. For the first time in masonry history, has any thought been given to the adhesive, power of mortars? SCPRF has developed such a mortar and it is perfectly weather resistant. This may mean thinner walls, stronger walls and new engineering factors for these walls.

* * *

The SCR brick laying system is catching on even faster than the foundation can train the contractors. Not all of the contractors use all the elements of the system but enough of the system to sell homes for less, make more profits, get more work and make work easier for the brick layer. By the next real building boom (1963-4-5)? the teaching of the process should be very widespread.

* * *

Lightweight aggregate manufacturing is proceeding on schedule. Clays for the first two furnaces are proven and work on the furnaces is proceeding. Enough aggregate has been made in the lab for thorough testing of its application in the block itself. Now the pieces are being put together for production.

* * *

Mortars A and B which are painted on brick surfaces are undergoing further testing and developing. By themselves, each one is inactive. But placed in contact with each other, the bond is strong. Since there is a reasonable time interval between first contact and hard setting, the brick can be adjusted to proper position in the wall.

* * *

The first all masonry (urban renewal) house is ready to go. The reinforceing beams which will be used as both floor and ceiling have tested out OK. The entire idea opens up a completely new approach to building with brick—it's a modern approach.

* * *

Research in the brick industry is attaining the importance to the industry that research has done in other industries as chemicals, rocketry, automobiles and electronics. These industries have research so well developed that it is a real sales tool. Witness the actual slogan of research in sales: "Research is our most important product." "Better living through research." What could or should the brick industry say? "Sound research produces sound building products," "research leads the way to a better home," or should we say "finer homes through brick research."

* * *

The research program is now in its eleventh year. Many ideas have been sifted and tried. Sparingly few have been carried out to a successful end. But even fewer have been willingly put into production by industry. Good ideas—perfected by research—one on the shelf ready for adoption. Possibly Kettering was right—it takes 15 years for an idea to go from concept to production.

* * *

The officers and members of the Board of Management and Executive Committee of SCPRF are all men with long and wide experience in the structural clay products industry. This experience and knowledge is of great importance in guiding the work of the Foundation.

DONALD J. "DON" RENKERT, vice chairman of SCPRF is typical of those industry leaders who willingly devote so much of their own time to research matters. Don, who is president and general manager of Metropolitan Brick, Inc., of Canton, O., has been associated with the clay products industry for over 38 years—since his graduation from Yale University in 1922.

Figuratively speaking, his interest in brick and tile goes back to 1896 when his father, Harry S. Renkert, became associated with the Shale Brick Exchange. In 1902 he founded Metropolitan which, at that time, specialized in the production of paving brick.

Don started "at the bottom" with his father's company and, in moving up, has served Metropolitan in a variety of responsibilities. In addition, he has been active in Industry affairs, both regionally and nationally. He was one of the founders of Region 4 of SCPI and has served on the Board of Directors and on many committees of National SCPI since its organization. At present he is a member of the important SCPI Depletion Committee. Metropolitan is one of the charter members of the Research Foundation and Don has served on its Board of Management since its inception in 1950. He is currently serving as Chairman of the Facing Tile Institute also.

* * *

The "SCR multi-story construction" concept may soon have its first application in this country. When first developed by Clar Monk of SCPRF and Robert Davison of Howard T. Fisher and Associates back in 1952, it received widespread publicity by the architectural press. It was so revolutionary and daring, however, that few designers in the United States at that time dared to try it. The fact that few building codes would permit such construction, despite its sound engineering basis, was another road block to its use. In the meantime, however, the Monk-Davison multi-story design concept has been used in the design and construction of a number of multi-story housing structures in Switzerland.

Now a leading architectural-engineering firm in the east wants to use it in the construction of a 6 story apartment house to be built in an Eastern Seaboard city. Their cost analysis indicates that it would be considerably cheaper than conventional concrete or steel frame construction. Foundation staff members are working closely with the firm in obtaining building code approval and realistic costs figures. This could be an example of what "Boss" Kettering meant which he said that it often takes 15 years for an idea to go from concept to production.

* * *

MAY, 1959—MERGER OF MEXICO REFRACTORIES COMPANY brings into Kaiser Refractories one of the nation's finest ranges of fireclay and silica brick, plus famous Mex-R-Co specialties.

FEBRUARY, 1960—KAISER TAR-BONDED DOLOMITE BRICK sets new production record in basic oxygen furnace—30,625 tons in 277 heats. Brick resists hydration in storage.

APRIL, 1960—NEW PERICLASE PLANT, Midland, Michigan, with capacity of 45,000 tons, increases Kaiser Refractories' annual capacity to 165,000 tons of high-purity MgO furnace grains.

AUGUST, 1960—NEW TECHNICAL CENTER under construction at Mexico, Missouri, augments application research and technical services of Research Laboratory at Milpitas, California.

OCTOBER, 1960—NEW BRICK FACILITIES under construction at Columbiana, Ohio, to make tar-bonded refractories for the basic oxygen steel process, supplements Moss Landing, Cal. plant.

IN 1961 GET THE PROFITABLE ANSWER FROM KAISER REFRACTORIES

Ask for proof of performance. Ask for virtually any refractory material. Ask Kaiser Refractories . . . and you'll get this year's most up-to-date, profitable answer!

There are two reasons why. First, your Kaiser Refractories Sales Engineer probably has recent data about a case similar to yours, gathered by trained technical people. Second, Kaiser Refractories' growing variety of materials, brick, castables and specialties provides the finest choice in the industry today.

For information, contact Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc. (Canadian Subsidiary: Refractories Engineering & Supplies, Ltd.)

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MIX-MULLER®

MEANS CONTROLLED DISPERSION

. . . AT NORTH AMERICAN REFRACTORIES COMPANY

Automation speeds processing, guards product uniformity.

No guesswork goes into the batch preparation and blending operation at North American's Curwensville, Pa., fire brick plant.

High above the press floor, two No. 3 Mix-Mullers are programmed to blend and disperse just the right amount of moisture and dry fire clay mix on a cycle carefully calculated to deliver a continuous flow of material to the presses. A central control panel permits flexibility of operation; saves time, labor and affords full and effective use of raw materials.

No guesswork went into North American's choice of mixers for this important operation either! As longtime Mix-Muller users, North American engineers selected Simpsons for their easy adaptability for automatic charge, discharge and cycling . . . as well as for Mix-Muller's proven ability to develop optimum pressing and firing characteristics for quality refractory products.

If you mix dry solids in this age of better and *more expensive* raw materials . . . can you afford to settle for *less* than *controlled* dispersion?

Dale Kephart controls dry press batch preparation and mixing operations at the Curwensville plant from National *"Time Master"* control panel.

WRITE FOR THE HANDBOOK ON MULLING.

C-161

SIMPSON MIX-MULLER® DIVISION National Engineering Company

646 Machinery Hall Bldg. • Chicago, Illinois

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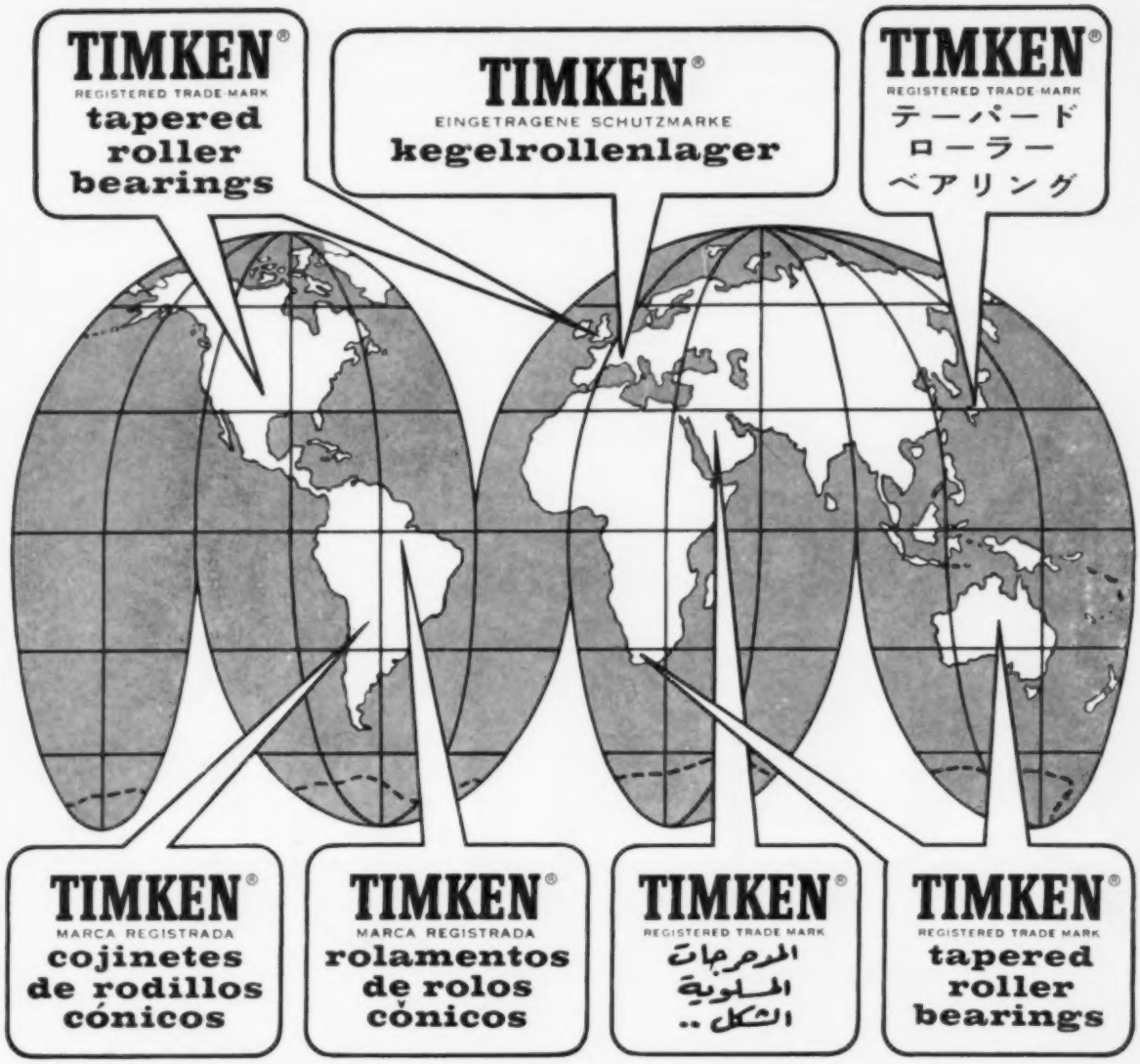

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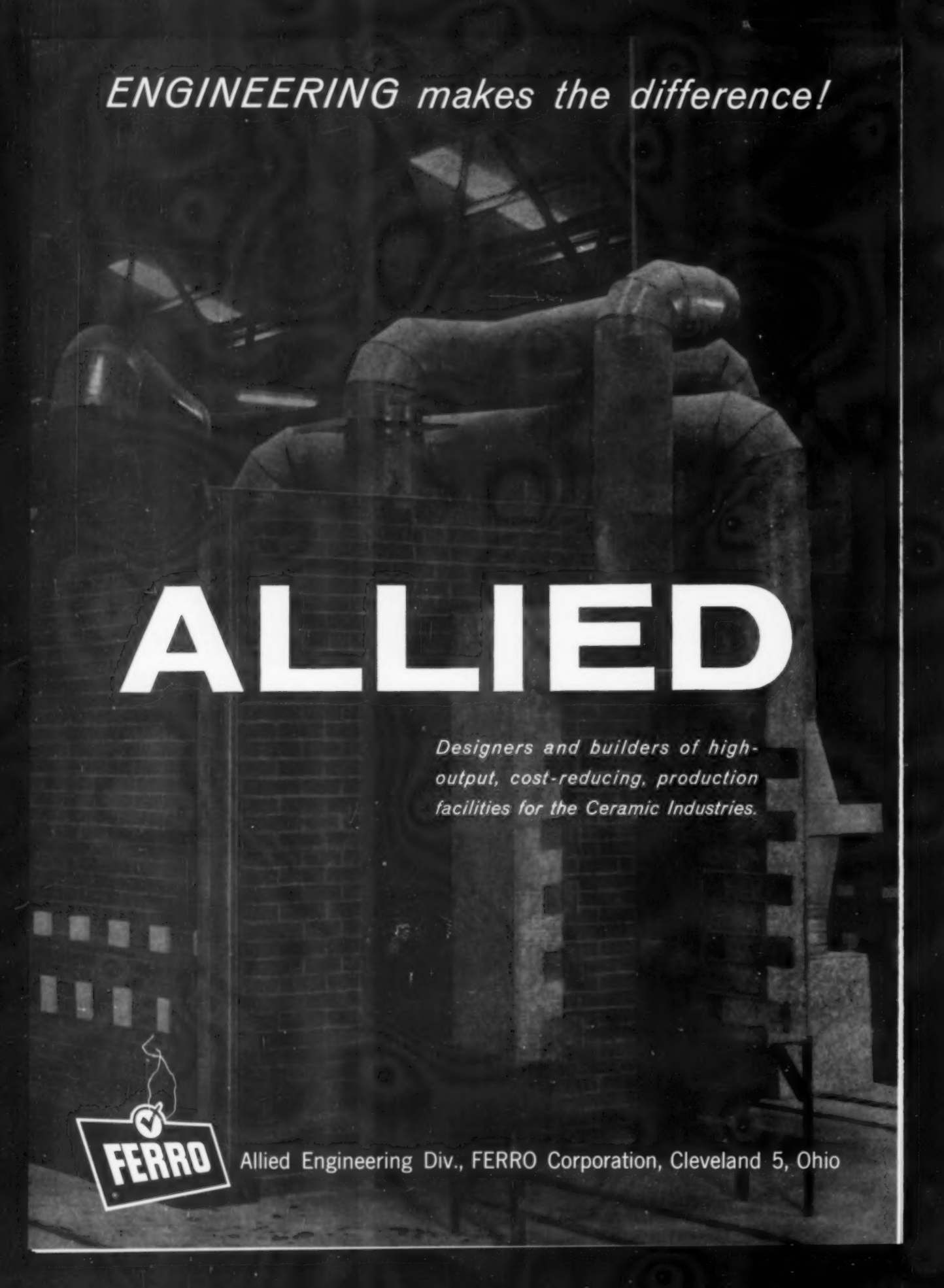
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September 30, 1960

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In the hope of solving this problem, some months ago we ordered two of your M-T Matic buckets to compare them in usage with the standard buckets. We find that they are truly self cleaning and in addition are a substantially better constructed bucket. Consequently, we ask that you ship us 100 12" X 7" PeKay M-T Matic buckets style AA.

In the hope of solving this problem, some months ago we ordered two of your M-T Matic buckets to compare them in usage with the standard buckets. We find that they are truly self cleaning and in addition are a substantially better constructed bucket. Consequently, we ask that you ship us 100 12" X 7" PeKay M-T Matic buckets style AA.

Thanks for your prompt attention.

Sincerely,

N.C. Sorenstein
Vice-President

- Carry a full load on every trip.
- Load cannot stick in buckets.
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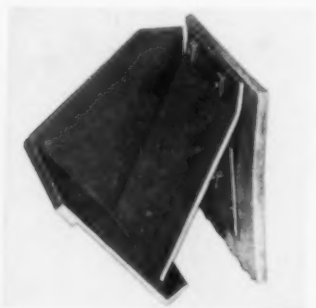

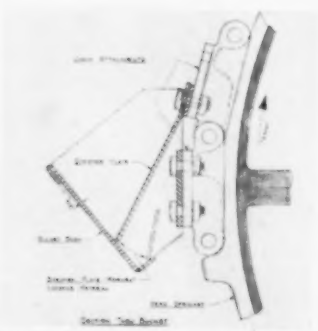

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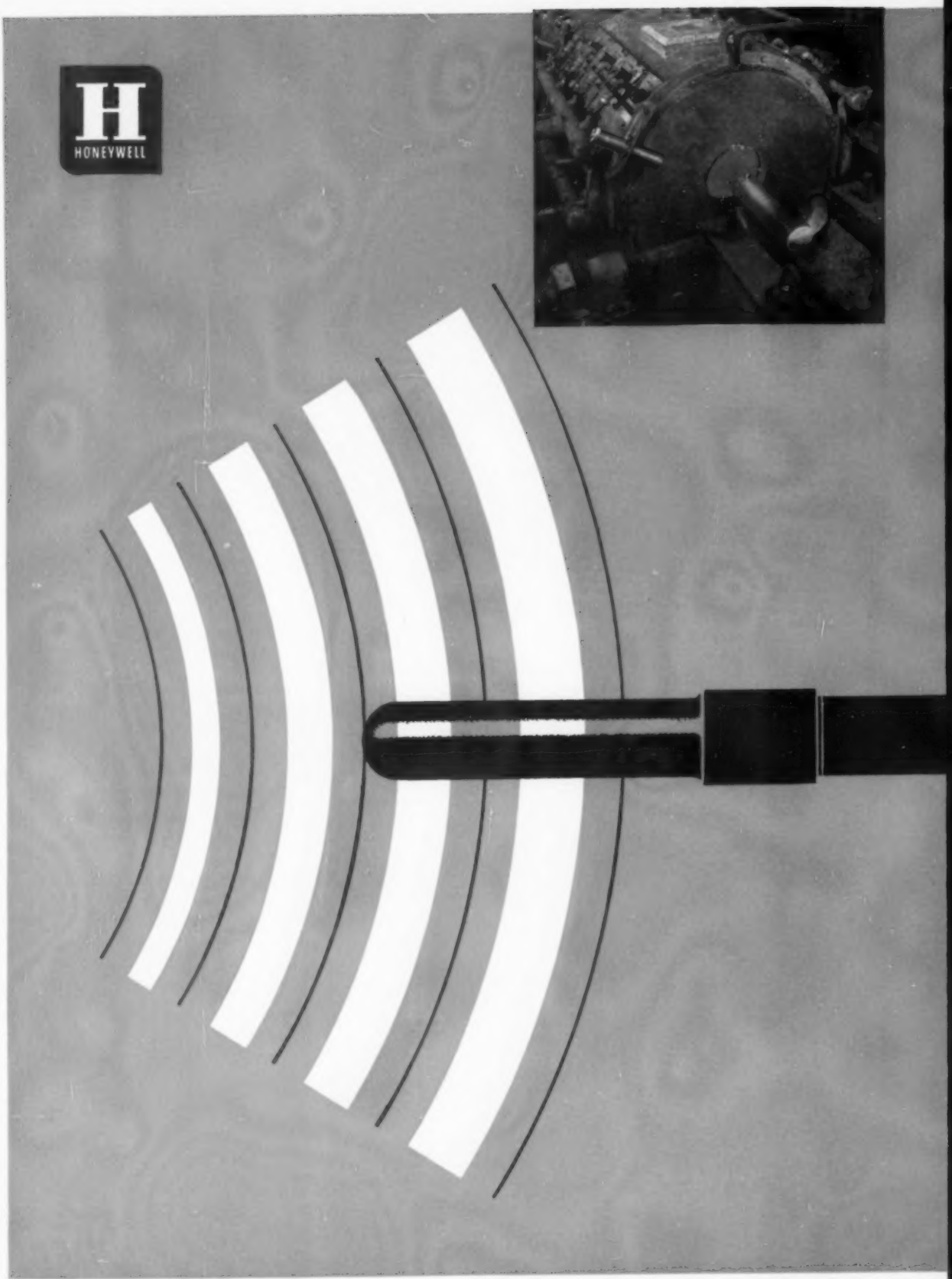
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For more than 20 years, *Radiamatic* Infrared Systems have been giving reliable, accurate service in every area of industrial temperature measurement and control. Over the years Honeywell has developed special infrared techniques and equipment for a wide range of applications, including heat treating furnaces, soaking pits, induction heating and melting furnaces, forging furnaces, high-speed salt baths, kilns, and many others.

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First in Control

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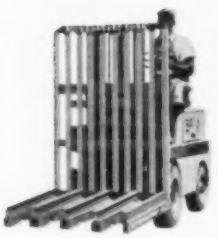
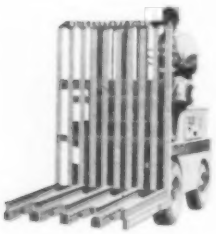
Circle Service No. 40

Your Profit in 1961 will depend largely on your brick handling cost!

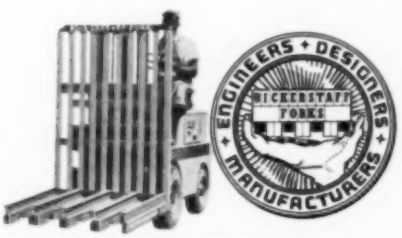




a Bickerstaff Fork *(with MM) will keep that cost as low as you can get it!

Keeping costs down while increasing production and profits seems like a pretty big job. It is big - even bigger without a Bickerstaff Fork. This proven performer, at progressive plants all over the country, is praised most for its handling efficiency and profit-making ability. Put it to work for you early in 1961. The full story about Bickerstaff Forks is available on request. A call, wire or letter will bring it to you, pronto!

* M-M MINIMUM MAINTENANCE ON ALL FORKS



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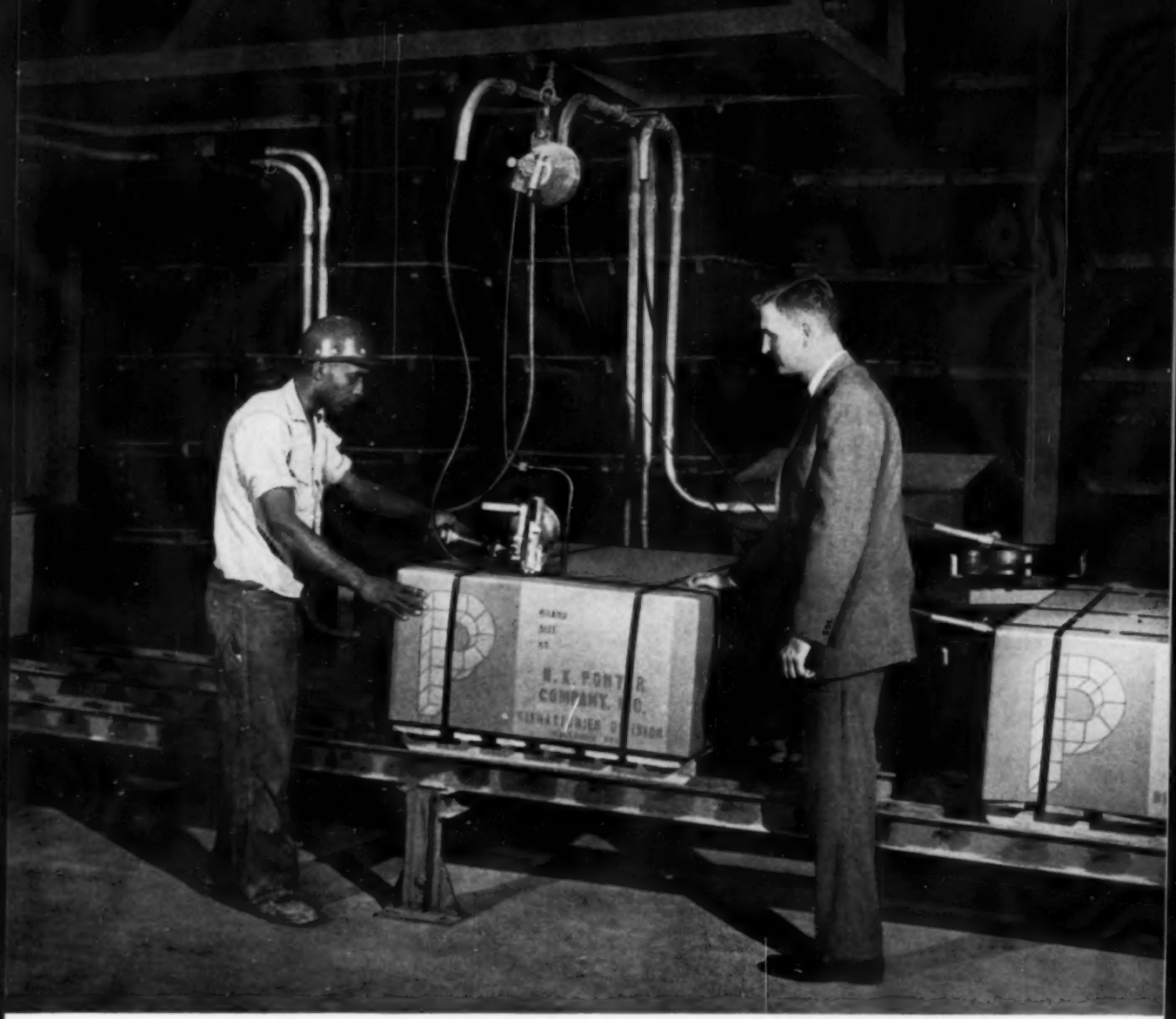

Acme Idea Man Allen Johnson helped the H. K. Porter Company, Inc. Refractories Division, Pascagoula, Miss., plan Idea No. 53-74.

The Acme Steel Strapping Station planned into this new refractory brick plant has far exceeded expected packaging output.

Originally, this firm anticipated a daily rate of 96 wrapped and strapped packages—palletized for faster, safer handling. But, the two-man crew is currently packaging 120 units per 8-hour day with their fully-powered A4 Pneumatic Steelstrappers. And they can turn out an even greater number when the need arises.

Your Acme Idea Man often plans fire brick packaging systems that exceed expectations. For details, call him or clip the coupon.

ACME STEEL

IDEA LEADER IN

STRAPPING

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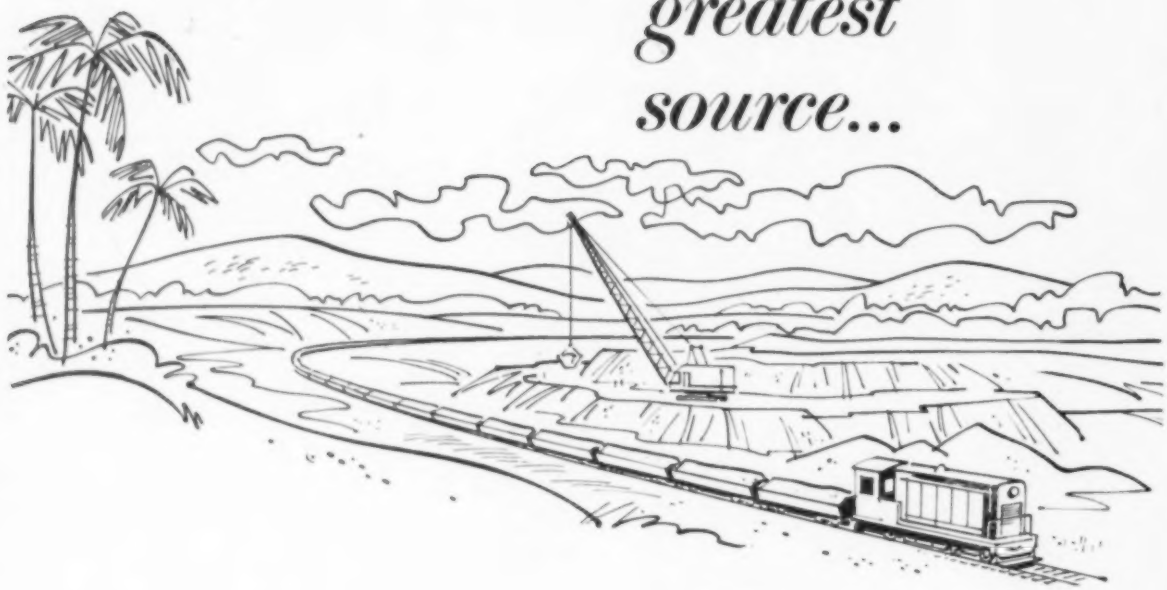

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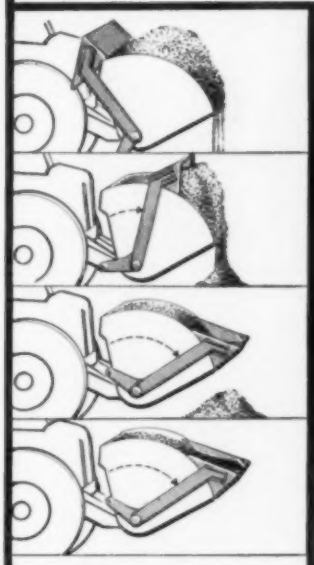
St. Louis	10 South Brentwood Blvd.
Buenos Aires	Ave. Ing. Luis Huergo 1279
São Paulo	Rua Antonio de Godoi 122

Circle Service No. 43

New PAYLOADER® NO-SPILL Bucket



A strikerbar-spillguard blade, by hydraulic power, sweeps forward removing excess material. Blade remains forward in transport to retain load.

- Eliminates spillage during transport
- Saves costly floor and aisle clean-up
- Eliminates re-working spilled material
- Increases daily productive capacity
- Delivers uniform loads for "batching"

The "No-Spill" bucket is the latest of many PAYLOADER *firsts*, and makes the tractor-shovel a cleaner, more productive and more efficient materials mover than ever before. Its two features — the striking-off of excess material while loading, and preventing any loss of load while transporting — give many on-the-job savings and benefits:

1. Permits higher transport speeds for more trips and more production.
2. Delivers bigger loads as none is lost in transit.
3. Eliminates the dust nuisance caused by light, dry materials spilling in transit.
4. Prevents the accumulation and build-up of spillage along aisles — saves the cost and time of digging up and reprocessing such spillage.
5. Eliminates the contamination and waste involved when different materials are spilled on the same routes.

Three popular PAYLOADER sizes can be supplied with "No-Spill" buckets — the Models HA, H-25 and HAH. Your Hough Distributor will be happy to show you what they can do to improve materials moving efficiency on your operations. See him today or return the coupon.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER and PAY are registered trademark names of The Frank G. Hough Co., Libertyville, Ill.

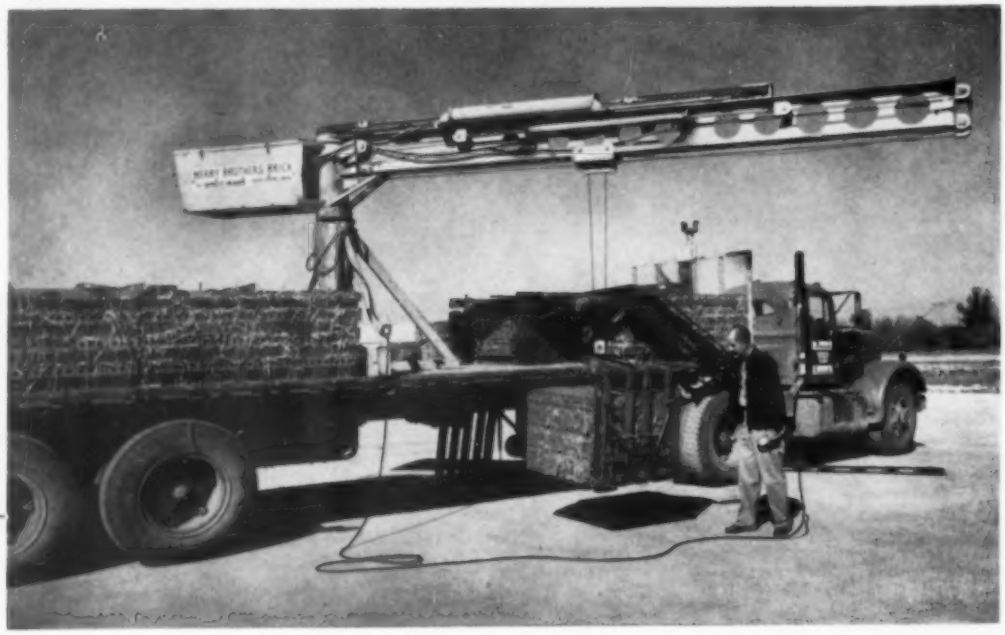
THE FRANK G. HOUGH CO.
753 Sunnyside Ave., Libertyville, Ill.
Send Information on "No-Spill" Buckets for PAYLOADER models.

Name _____
Title _____
Company _____
Street _____
City _____ State _____

1-A-1

Circle Service No. 44

6 SUPERLITE BOOMS SERVE MERRY BROS...



At Merry Brothers Brick & Tile Co., SUPERLITE Boom Unloaders were tried and tested in operation alongside two competitive boom-type unloaders under actual working conditions. The result—starting with one SUPERLITE Boom in April 1960, and three more in July 1960, Merry Bros. now has SIX SUPERLITES. They are operated with Bickerstaff Gripper forks. Complete information on all SUPERLITE products is available without cost or obligation.

Write or Call

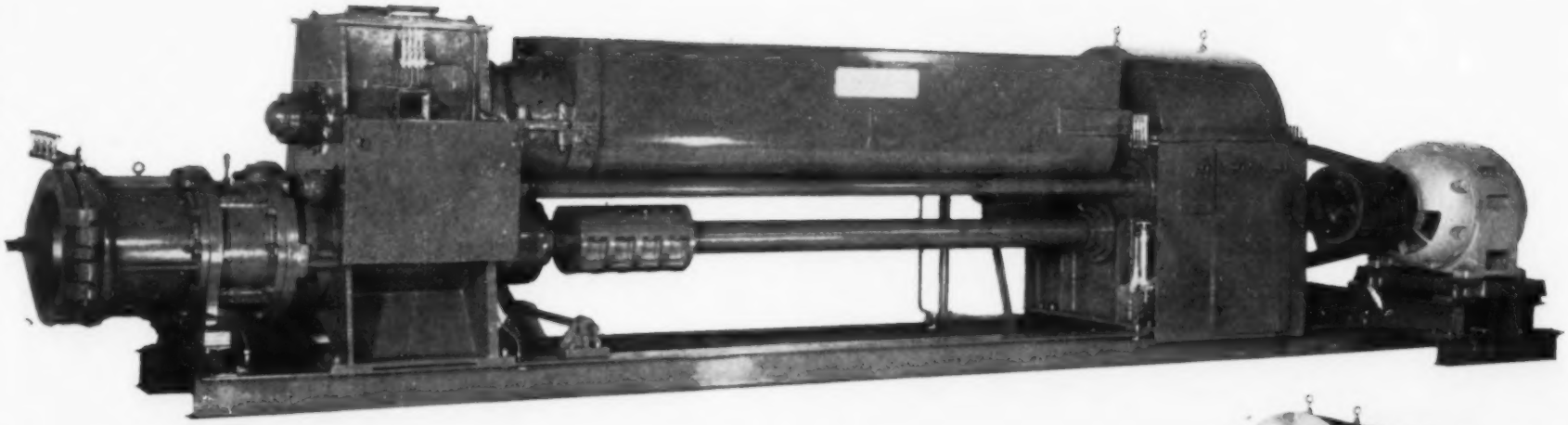
Why Don't You Enjoy

Fast—Effortless—Economical—SUPERLITE Unloading?

BUILDERS EQUIPMENT COMPANY

P.O. BOX 7143
PHOENIX, ARIZONA
Telephone Numbers:
·YEllowstone 7-4741
·YEllowstone 7-4742

Circle Service No. 45

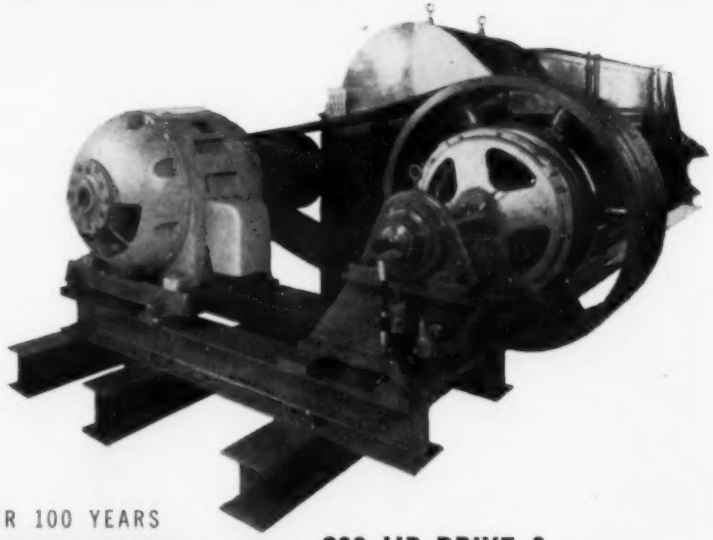


Chambers

No. 12 AC-HI-POWER MODEL

Built with modern materials new to the field, and with refinements to match 1960 engineering techniques, this great Chambers machine reflects the experience of tunnel-kiln operations, where breakdowns are intolerable. Shafts and gears are high alloy, 150,000 psi, steel; all barrel sections, adaptor and die holder are solid steel. All gears, helical-cut, flame-hardened steel, with a double reduction of Approx. 12:1. Centralized lubrication.

18¾" auger, fed by 21" augers in vacuum case. 12' pug mill tub. Point augers can taper to 16" or 13". These same efficient augers are available in the Chambers #212 with dual drives and optional vacuum pugging. Write for further details.



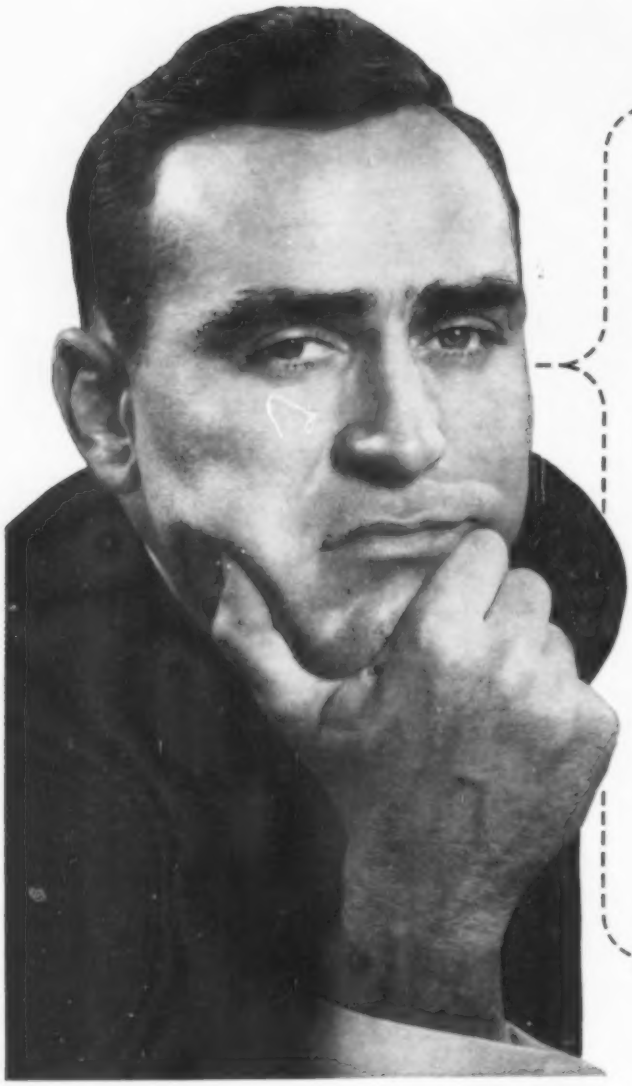
200 HP DRIVE & FAWICK AIRFLEX CLUTCH

Drive has short, efficient V-belts. Main clutch remote controlled; separate pug mill clutch. Totally self-contained mounting. Motor options up to 300 HP.

SERVING YOUR INDUSTRY FOR OVER 100 YEARS

CHAMBERS 1857 1961
BROTHERS CO.
52nd & Media Streets · PHILADELPHIA 31, PA.

Circle Service No. 45



I wonder if we should use Ajax Kaolin in our development of new refractories?

If you, too, are engaged in research aimed at developing improved refractories, we suggest you investigate the properties of Ajax Kaolin clays. They have basic characteristics similar to ball clays, but offer these advantages:

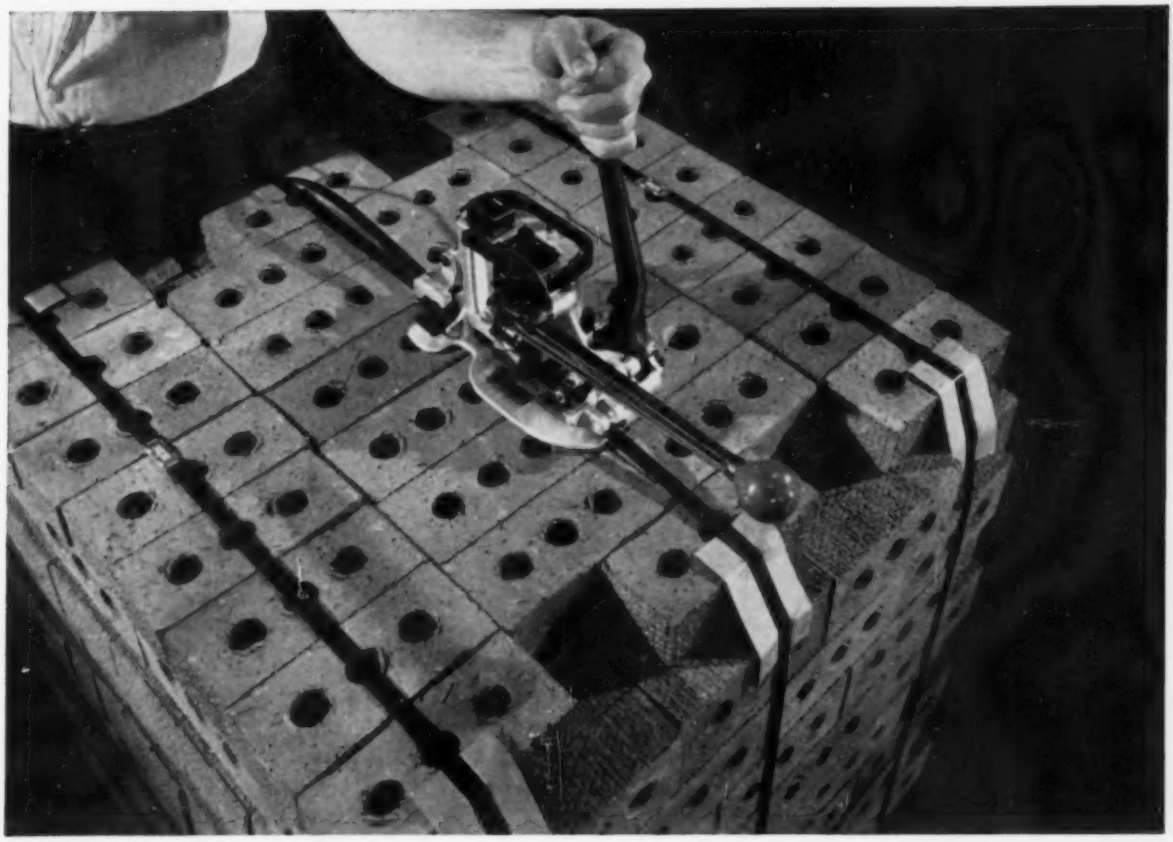
1. Very high purity—free of silica, mica and other detrimental materials.
2. Highly plastic—presses, extrudes, casts easily, gives a smooth surface.
3. High green strength—increases handling efficiency.
4. Pyrometric cone equivalent—PCE 36.
5. Uniform from shipment to shipment.
6. Proven successful in refractory production.

Look to Georgia Kaolin as a source of dependable technical assistance as well as kaolins of the highest purity.

Georgia Kaolin Company 433 North Broad St., Elizabeth, N. J.

Fine clays from the world's largest kaolin plant

Circle Service No. 47



Usable strapping strength... how to get the most at least cost

As you probably know, the strapping of brick poses one of the most severe of all tests of strapping strength, toughness, and resistance to corrosion. Your product is heavy, has no "give", and packaged brick is exposed to weather. Yet tight, secure strapping is essential to good arrival condition.

Signode knows these things, too. So...we invite you to do three things to get the most usable strapping strength at least cost:

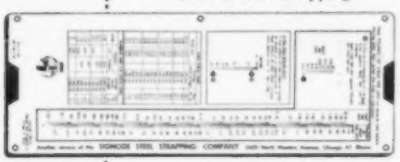
1. Try for yourself the strength and toughness of the Signode Magnus steel strapping made especially for the brick industry. We believe you'll find the demonstration surprising—at least interesting and worth your while.
2. Let the Signode man discuss ways you can use the strength of Signode strapping to best advantage in your own operations. They'll be practical ways. Remember he is experienced, and can call on Signode's years of accumulated experience in brick packaging methods.
3. Send for our new Steel Strapping Calculator. It helps you buy steel strapping at least cost according to your needs, and shows new strength figures for Signode steel strapping.

SIGNODE

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2629 N. Western Avenue, Chicago 47, Illinois



☐ Please arrange a demonstration for me of the strength of the strapping Signode recommends for packaged brick.

☐ Please send me without charge or obligation the new Signode Steel Strapping Calculator.

name_____

company_____

address_____

city_____ zone_____ state_____

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide

In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

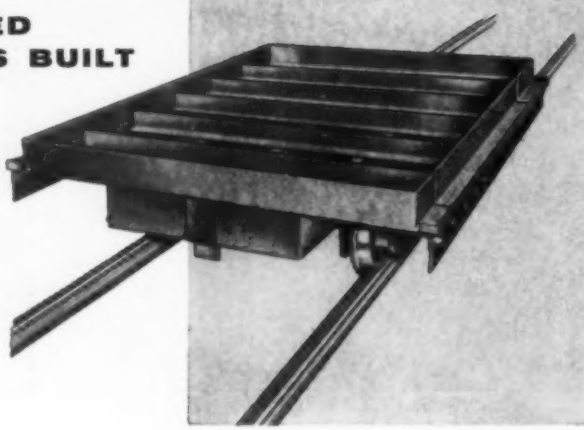
Circle Service No. 48

INTERNATIONAL CLAY MACHINERY CO.

ERIE, PENNSYLVANIA

INTERNATIONAL

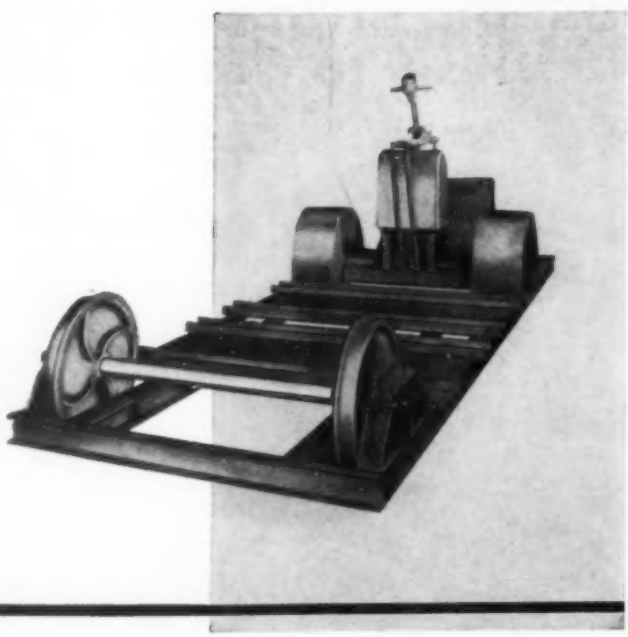
THE MOST RUGGED INDUSTRIAL CARS BUILT



Over a half of a century of experience helps INTERNATIONAL design and manufacture better kiln and transfer cars with a world reputation in the clay and brick industry for top performance.

Constantly aware of the severe operating conditions and heavy loads encountered in the ceramic industry, INTERNATIONAL designs to meet the big four; (1) rugged construction, (2) quality workmanship, (3) maximum service, (4) minimum maintenance.

Send for informative INTERNATIONAL literature . . . Request our engineering department for designs to meet spcial conditions . . . Insist on INTERNATIONAL for rugged dependability.



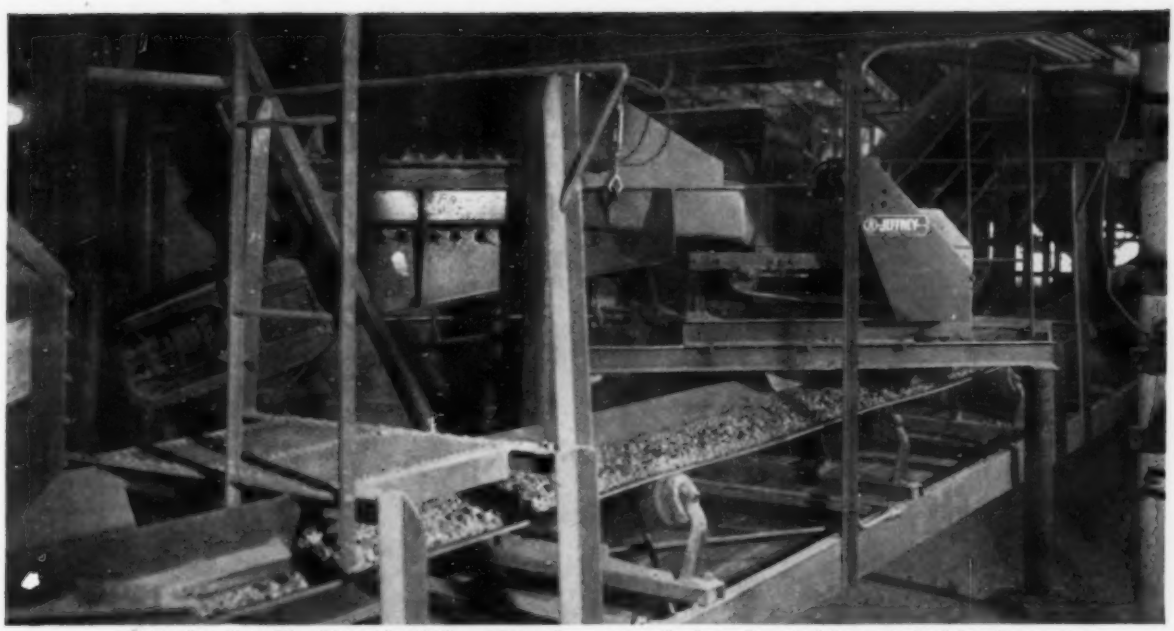
INTERNATIONAL

INTERNATIONAL CLAY MACHINERY INC.

1335 West 12th Street **TELEPHONE GL 4-6471**

ERIE, PENNSYLVANIA

Circle Service No. 49



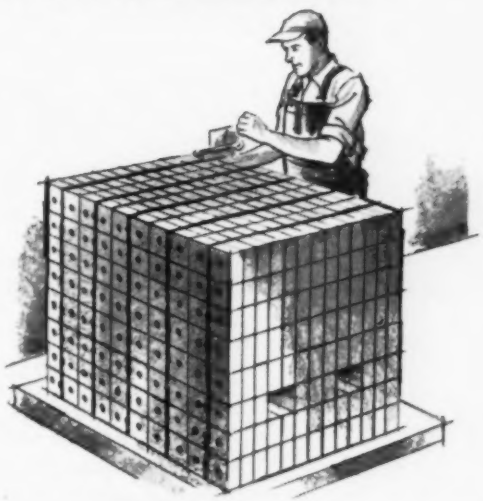
3 blending lines like this, with 7 Jeffrey Waytrols in each line, are in service at Henderson Clay Products, Inc., Henderson, Texas. With volume proportioning of materials controlled by these Jeffrey Waytrols, mix is always uniform and color variations are eliminated completely.

"Color Comparisons Haunted Us"

Henderson Clay Products used to need a constant vigil over mixtures to maintain brick color. Finished bricks that lacked the required color uniformity had to be sorted by hand—a slow, costly job.

That was before a tremendous expansion program to boost output from 4½ to 7½ million bricks per month was undertaken at their plant in Henderson, Texas. As part of this expansion program, twenty-one Jeffrey WAYTROLS® were installed. Operating in batteries of seven on each of three make-up lines, these Jeffrey Waytrols completely eliminate color problems caused by improper volume proportioning of materials. Now when quick, easy Waytrol settings are made, the mix stays fixed throughout an entire production run. Waytrols allow four or five different clays, as well as calcined clay or grog, to be perfectly proportioned so that color is always on the button.

Other improvements made by Henderson include a new Jeffrey B-3 36″ x 60″ pulverizer with a Jeffrey feed to process calcined clay and broken bricks (grog).



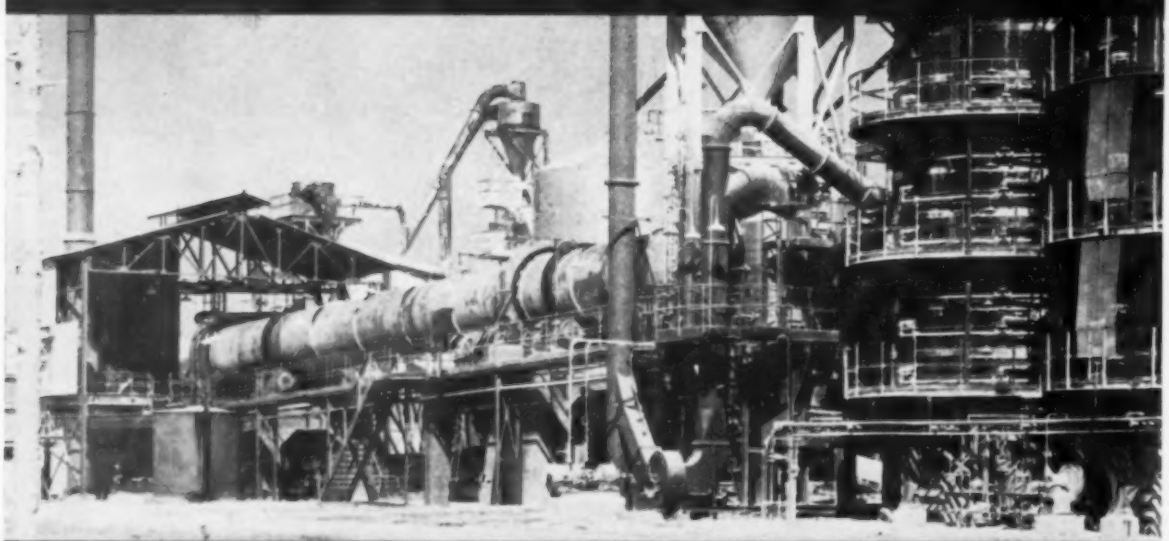
Waytrols will save labor wherever you're now doing manual measuring or weighing, and provide continuous feeding instead of batch methods. For further information about Jeffrey weigh-feeding, ask for Catalog 941. The Jeffrey Manufacturing Company, 916 N. Fourth St., Columbus 16, Ohio.

Conveying • Processing • Mining Equipment...
Transmission Machinery...Contract Manufacturing

JEFFREY

Circle Service No. 50

Now producing High purity REFRACTORY PERICLASE



Now in successful operation, the seawater magnesia plant of Michigan Chemical Corporation at Port St. Joe, Florida is producing high-purity refractory periclase which meets exacting specifications and is available in lump or crushed form for shipment by rail, truck, barge and ocean vessel.

A complete series of magnesium oxides also is available from the Florida plant as well as from the company's Saint Louis, Michigan unit. If active or light density products are required, these can be supplied from either facility.

For samples, data and prices, phone or wire Magnesia Sales Division, Saint Louis, Michigan — or contact your nearest Michigan Chemical Representative.

M-60-3

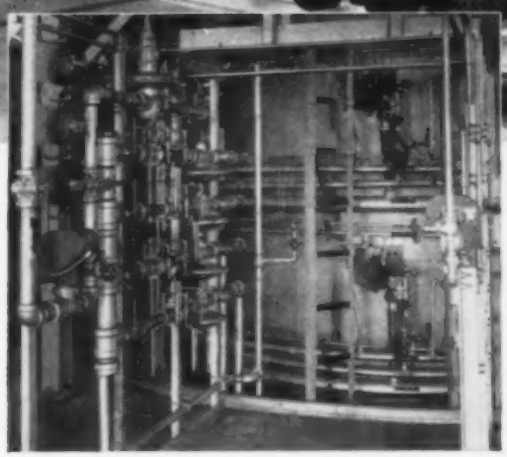
MICHIGAN CHEMICAL CORPORATION

707 North Bankson Street, Saint Louis, Michigan
Eastern Sales Office: 230 Park Avenue, New York 17, New York

Copyright 1960 Michigan Chemical Corporation

Circle Service No. 51

Minimize Rejects–Maximize Savings
with North American Burners, Blowers, and Controls



3 Car Type Furnaces are top and bottom fired with 38 Dual-Fuel XSA Burners each in 3 zones. NA Adjustable Port Valves and #16 Regulators provide correct fuel-air ratio at high fire, progressively throttle fuel faster than air to 250% excess air at low fire.

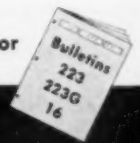
5 Pit Type Furnaces (8' x 18') are each fired by 16 Dual-Fuel XSA Burners in 2 zones. NA Valves and Regulators adjust gas & oil input; air stays constant. Fuel turndown is 5:1, but effective heat turndown is infinite—even to controlled cooling.

NORTH AMERICAN
XSAir Combustion System gives extra controllability

National Forge Company needed a uniform temperature *throughout* every load of crankshafts—not just at the controlling pyrometer locations—so they selected a North American XSAir Combustion System to do this critical job.

You can't eliminate hot spots and cold corners by merely controlling an *average temperature*—you must also limit the temperature extremes everywhere in the furnace. The XSAir System does this by bringing the maximum and minimum temperatures closer together.

For engineering information, call your nearby North American Combustion Engineer or write for

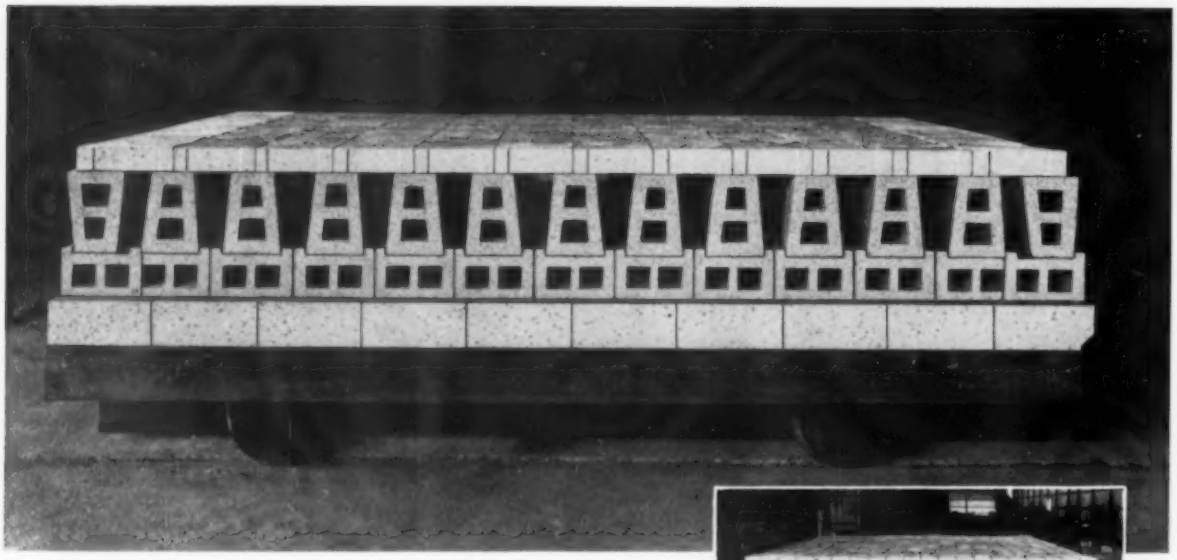


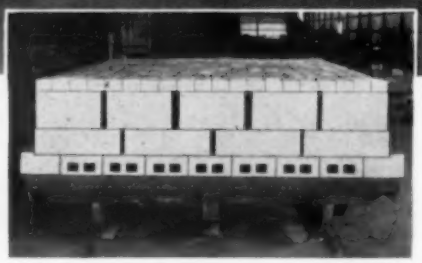
NORTH AMERICAN for COMBUSTION and Hydraulic Controls

The North American Mfg. Co.
Cleveland 5, Ohio

Circle Service No. 52

New Under-Fire Car Top Arrangement by PACO





...using an exclusive "A" Girder and Open Channel Block design!

Look at these outstanding PACO advantages! The "A" girder shape provides *greater stability* and offers less resistance to flame and gases. Their relatively thin wall (1⅜" max.) and open cores allow the products of combustion to freely pass through, around and between each girder and on to the entire deck surface for even distribution throughout the setting. The "bottling up" of heat in any one area is virtually eliminated. Cooling is also more uniform.

Only PACO Car Tops are made from the mineral pyrophyllite. They are stronger and highly resistant to thermal shock and hot load deformation. In addition to the under fire arrangement shown above, PACO Car Tops are made in a wide variety of shapes and sizes. Phone or write for complete information today. *You may be able to reduce your car top replacement costs by as much as 50%!*

NORTH STATE PYROPHYLLITE COMPANY, INC.

PHONE CYpress 9-1441 GREENSBORO, NORTH CAROLINA

OTHER PACO PRODUCTS INCLUDE: • Plastic Furnace Linings • High Temp. Cement • Fire Brick • Retort Cement • Blow Off Tile • Side Car Brick • Ladle Mix • Rear Arch Tile • Plastic Cupola Linings • Cupola Blocks

specifications

BOTTOM COURSE—PACO bottom block; side, corner and end blocks with center fill of castable refractory.

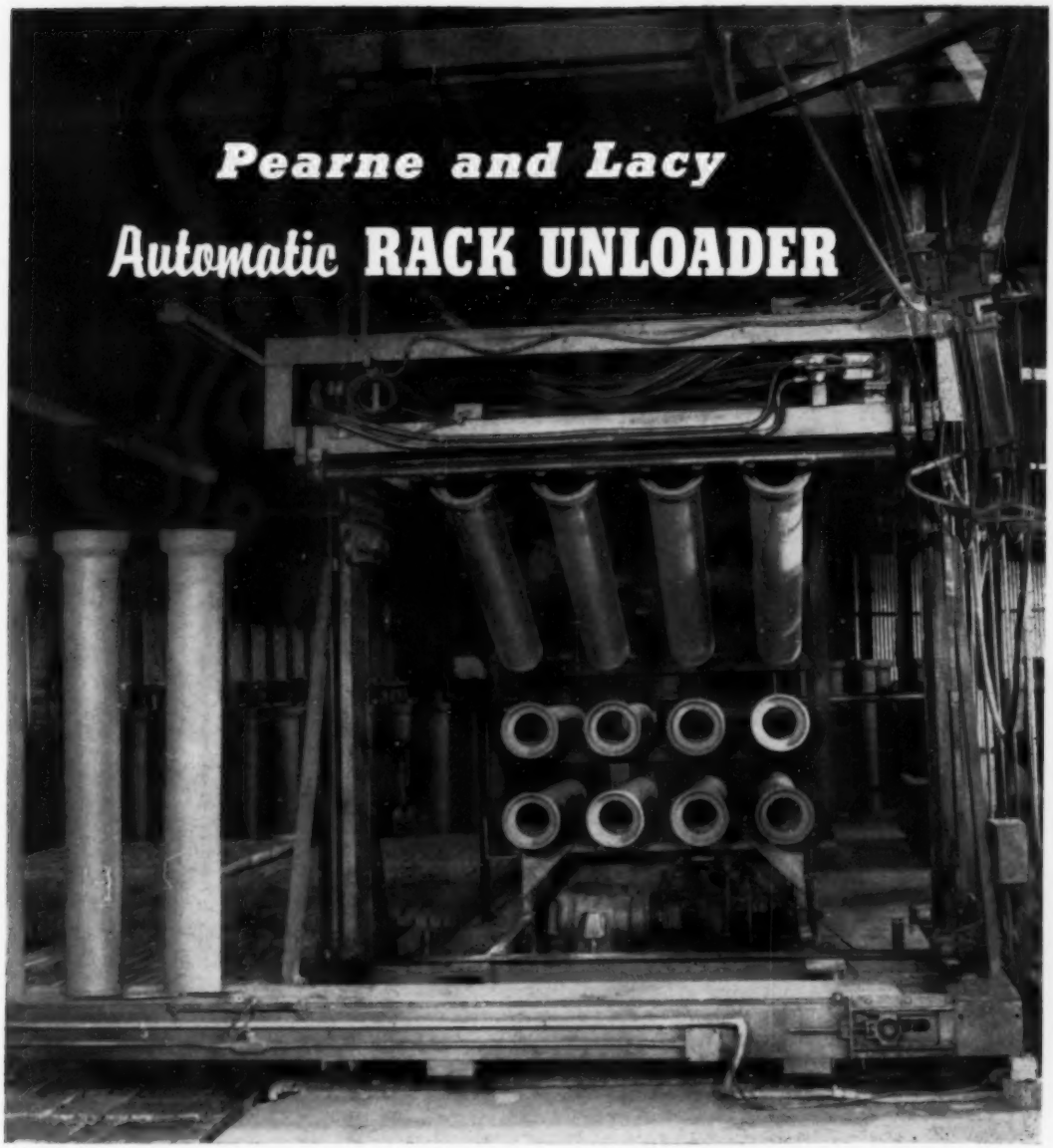
CENTER AND GIRDER COURSE—PACO channel block, designed to fit PACO "A" girder block.

TOP DECK—PACO 9" floor brick with two end courses of "A" girders, turned upside-down. The two end courses of floor brick are in a 10⅝" length to make car dimensions come out exactly right.

Open area in the deck is approx. 20%. Other PACO floor brick is available to give an open area of 30% or 40% for use with hollow ware and various other shapes requiring the larger open areas.

"A" girder block is available in heights of 7½", 9" and 11".

Circle Service No. 53



Patent Applied For

The automatic rack unloader is designed specifically to unload pipe from horizontal trays and place in a vertical position on a pallet or belt. Where a belt is used, it may extend into doorway of a kiln or may be located so as to transport pipe direct to kiln cars. The unit may be made mobile so it can be towed easily from one location in the plant to another. The rack unloader is completely automatic with optional manual controls.

- Operation unloads 4" to 12" pipe Automatically;
  A—Onto belt over kiln car
  B—Onto belt into periodic kiln
  C—Onto pallets which are automatically placed.
- Cushion control prevents shock to pipe.
- No manpower required.

Write for complete operation details.

Engineers and Manufacturers of Automatic Handling and Finishing Equipment for the Ceramic Industry.

P.O. Box 3366, Terminal Annex,
Los Angeles 54, California **Phone: CU 3-1268**

Eastern Representative
Dwight B. Hendryx, 6621 Darlington Rd., Pittsburgh, Pa.

Circle Service No. 54

PEARNE AND LACY INC. MACHINE COMPANY

Monolithic Construction Proved Better than Block for Kiln Car Tops!

Two year test proves PORTER FIRMCAST ideal refractory top for kiln cars. Firmcast monolithic top virtually eliminates maintenance, reduces sand leveling requirements. Develops full ceramic bond at 2000° F.

Porter Firmcast hydraulic setting castable refractory was tested for two years as a kiln car top, in direct comparison with clay block constructions. The results are conclusive. Firmcast monolithic tops are a highly practical improvement!

MAINTENANCE: Porter Firmcast developed a solid ceramic bond at a 2000° F. operating range, (the operating range of the test kilns) building a tough maintenance-free top. Out of 34 cars tested, only one minor repair was required on *one* car during the entire two year test. (Compared to a usual schedule of major maintenance after every 4 heats required by block constructions.)

INSTALLATION: Only 4-manhours needed to cast an 8″ x 7′ x 5′6″ top with Firmcast . . . no leveling . . . no mortaring.

SAND LEVELING: Firmcast's resistance to abrasion produced smoother decks for longer periods of time. Settings required far less sand leveling. Distortions practically eliminated. More uniform heating, even in first courses.

SAND LOSS: Sand from green block, given less opportunity to escape between large monolithic sections, did not foul seals nor decrease original car insulation.

Those are the facts: Better installations . . . improved heating quality . . . less maintenance! Aren't they sound reasons for you to try this improved method of topping kiln cars in your operation? For complete details, write: Kiln Car Tops, *Refractories Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh* 19, *Pa.*

REFRACTORIES DIVISION PORTER **H. K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Circle Service No. 55

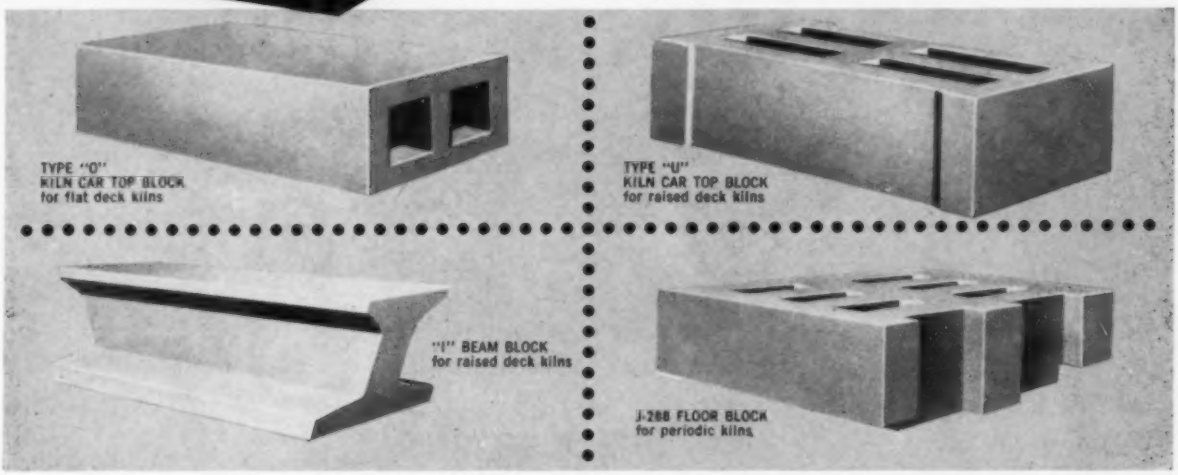
ROBINSON REFRACTORIES

Serve You Best!

New from Robinson!
High-Performance,
Low-Maintenance
KILN CAR and FLOOR BLOCK

It always pays to specify the complete line of Robinson Refractories. Take advantage of modern laboratory production methods, such as instrument-controlled firing, rigid quality control and expert engineering service. The Robinson name is your guarantee of quality. And a distribution system, unsurpassed, makes a complete line of refractories available to you at all times, through fifteen factory branches, in addition to Robinson dealers, strategically located throughout the Northeastern section of the nation.

Write for illustrated Complete-Line Catalog



Robinson Kiln Car and Floor Block are highly refractory . . . non-shrinking and non-spalling . . . have unsurpassed load-bearing properties. Available in a wide range of mixes, including two revolutionary research-developed formulas, designed to combat excessive thermal shock — THERMIX R-119 and R-127. Call the Robinson Branch nearest you. Your Robinson Representative will be glad to help you select the mix best suited to your specific application.

COMPLETE LINE FOR ALL YOUR REFRACTORIES NEEDS...

Fire Brick • Cupola Block • Ladle Lining Castable Refractories • Plastic Fire Brick Acid-Proof Cement • High-Temperature Bonding Mortar • Kiln Floor Block • Kiln Car Top Block

THE ROBINSON CLAY PRODUCT CO.
ESTABLISHED 1856
AKRON • OHIO

OVER 100 YEARS OF Quality and Service
EST. 1856

15 ROBINSON BRANCHES TO SERVE YOU BEST

Akron, Ohio • Albany, N. Y. • Baltimore, Md. • Caldwell Township, N. J. • Boston, Mass. • Buffalo, N. Y. • Chicago, Ill. East Hartford, Conn. • Indianapolis, Ind. • New York, N. Y. (Jamaica, L. I.) • Philadelphia, Pa. (Pottstown, Pa.) Rochester, N. Y. • Syracuse, N. Y. • Toronto, Ontario • Yonkers (Westchester County,) N. Y.

FACTORIES: Dover, Ohio — Strasburg, Ohio

Circle Service No. 56

"Any one of our *UNIT* ¾-yd. shovels very easily loads 600 tons of clay per day from the solid", says Ralph Veon, President, RALPH A. VEON, Inc., Darlington, Pa.

7 UNITS

in eleven years for Pennsylvania Stripping Contractor

Since 1949 Mr. Veon has used UNIT shovels for contract stripping of fire clay. He now owns seven of them — five ¾-yd. machines, like the Model 1020A shown here, and two ½-yd rigs. "We find these machines very maneuverable and easy to operate," he reports. "Our cost of maintenance has been satisfactory for the past eleven years."

UNITS are easy on the pocketbook because they combine power with design simplicity. With UNIT direct in-line drive from engine to main machinery, you get ample power for heaping loads on every pass. There's no separate right angle gear reducer . . . no wasted horsepower. UNIT one-piece cast main machinery gear case design, with all gears, shafts, and bearings completely enclosed and operating in an oil bath, provides positive protection against wear...assures longer machine life.

All operating clutches are disc type. Engaging pressure is uniformly distributed for maximum length of service from each friction surface. Involute splined shafts are used throughout to provide greater strength and less wear. Gears, worms, turntable rollers and many other parts are drop forged to withstand greater stresses under toughest job conditions.

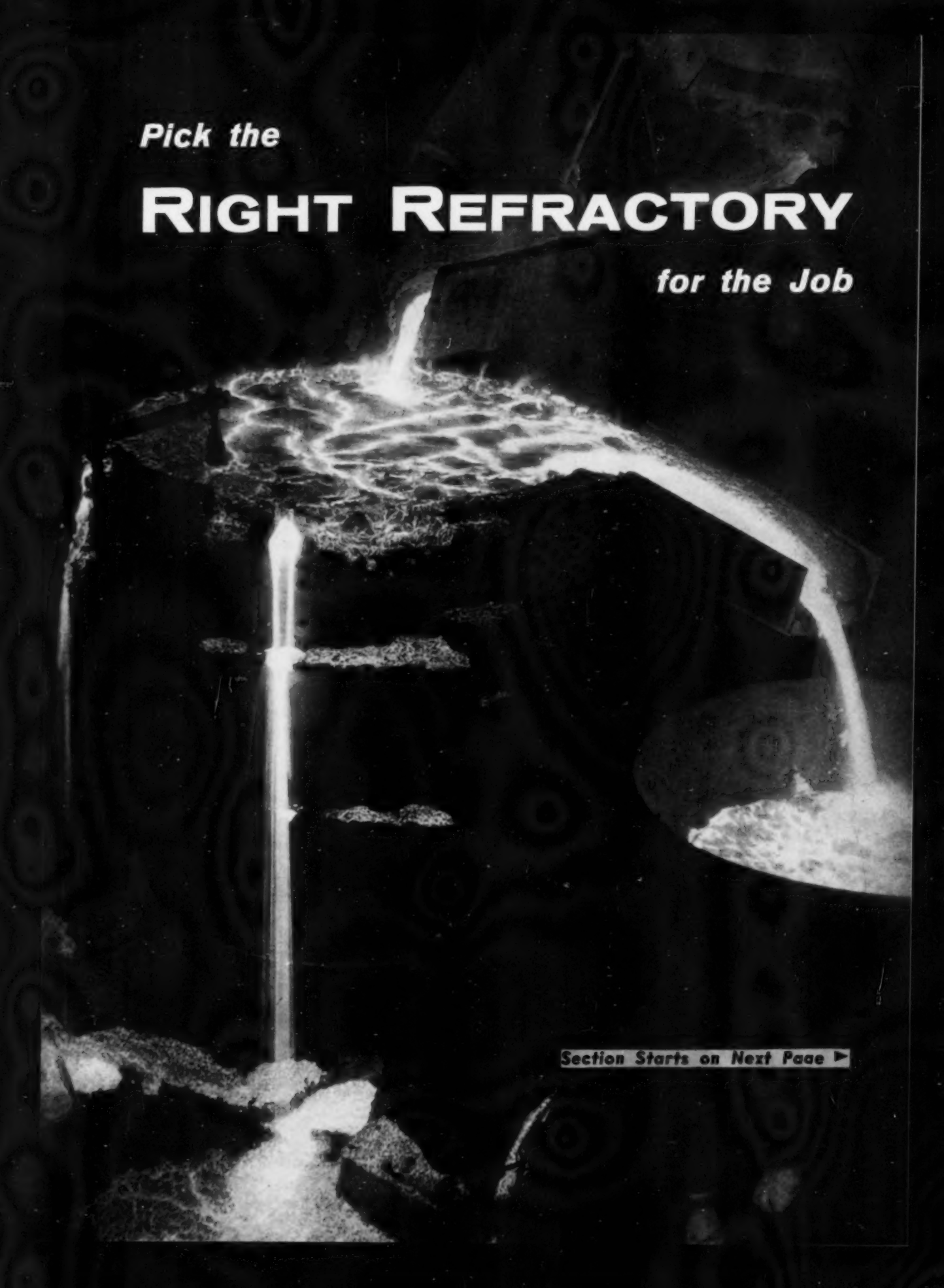
UNIT shovels and draglines are available in ½-, ⅝-, and ¾-yd. sizes. See your UNIT dealer soon to get complete information on the size you need.

UNIT

UNIT CRANE & SHOVEL CORP.

6649 W. Burnham Street
Milwaukee 19, Wisconsin

Circle Service No. 57


Pick the
RIGHT REFRACTORY
for the Job
Section Starts on Next Page ►

A Look at the Refractories Industry—1961

(Published below is an unsolicited, anonymous contribution on the spirit and function of the refractories industry, signed only "A Consumer." The editors felt that it stated the case for refractories so well that it would make a fitting introduction to this special section).

This is a large scale industry. It was not born that way but achieved it through mass production, research and engineering, without sacrifice of individuality and flexibility. It grew big by finding ways of serving industry better. To do this required vision, freedom and industry. It called for ingenuity as well as sincere faith in the future of the American way.

The management teams of the refractories industry have a tremendous responsibility because so many people and industries depend on them for advanced products to meet the current and future need of new products and new methods.

To do the job requires the skill and talents of many people from top management to the pit boss. It requires that this group work together as a team; their activities must be effectively organized for one purpose—*better refractory products properly applied*, so that production can be stepped up and costs held down.

The success of the American way lies in its people, and people make the principal difference between the U. S. way and any other way. Briefly, the success or failure of a business on any scale is *people*. They are producers of basic refractories—silica and clay refractories and a wide range of castables, plastics and ramming mixes.

Since the beginning the refractories industry, like fellow industries, has employed research. Within the last decade research has made great strides in all categories.

Research and production have played a major role in the development of advanced types of basic refractories and specialties for application to steel, glass, cement, oil, chemical and aluminum industries.

When required, the refractories industry has made its facilities and talents available to our government for defense materials and has done so promptly.

Doing this kind of a job is the industry's constant endeavor, and what has happened in the past will continue in the future, but at a quickening pace as technology advances. All of this means just one thing—better production at lower costs to the consuming industries.

The refractories industry, with all of its fine facilities and people, could not meet its high goals without the help of its many suppliers of materials, parts and services. The refractories industry needs these suppliers—the progress of our business and the suppliers is necessarily mutual and complementary.

To enjoy the customer's business we must give consistently good values over the years through constant market surveys, marketing research and engineering—through better production methods and equipment techniques. This is the true meaning of industry progress and should be undertaken so that the consumer and producer alike will benefit in profit and performance.

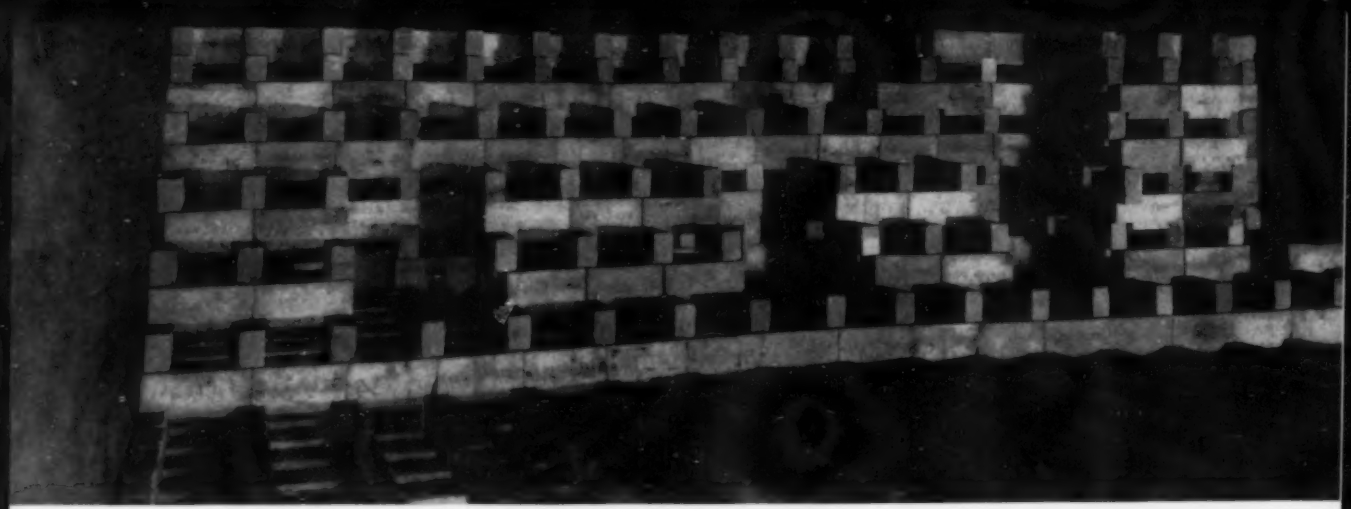
The refractories industry depends on many independent businessmen to buy, sell and service its products. These agents and dealers manage their own businesses, maintain their own warehouses and service facilities; they employ salesmen and servicemen; they take a active part in the community; they render essential service to the many users of refractories—yes, distribution is a vital part of our business.

Every company is started with the hope that it will produce a return on its money—the owners (stockholders) know that no business can hope to do this for long unless it serves its customers well. Every producer is creating useful products and services and in turn these create income and business for owners, employes, dealers, agents and the industry's suppliers.

The advancement of the industry has meant steady jobs and good paychecks for thousands of people from coast to coast.

The current habit of looking ahead is not confined to our research centers or production units or people—we believe that everything and anything can be improved. We are never exactly satisfied with things as they are—this principle is apparently a basic one for the refractories industry. We help our great industries by doing our part to provide them with refractories, methods and services to do their job better.

A Consumer



Common use for fireclay brick is in open-hearth regenerators.

Fireclay: 70% of Total

Approved by General Refractories Co.

Fireclay refractories are the most widely used refractories, accounting for about 70% of all production. They are made from naturally occurring mixtures of hydrated aluminum silicates, clays and uncombined silica. Four groups of fireclay bricks are available, namely, low duty, intermediate duty, high duty, and super duty.

The essential components of fireclay are the hydrated aluminum silicates. The general type formula is Al_2O_3-$2SiO_2$-$2H_2O$, corresponding to 39.5% alumina, 46.5% silica, and 14.0% water. Kaolinite is the most common member of this group. At high temperatures the water is driven off and the resulting product theoretically consists of 45.9% alumina, and 54.1% silica. However, even the purest of clays as mined contains small amounts of other constituents such as compounds of iron, calcium, magnesium, titanium, sodium, potassium, lithium and usually some free silica.

Important Refractory Clays

The clays of greatest importance as refractories are flint and semi-flint fireclays, semi-plastic and plastic fire clays and kaolins.

Flint clays, known also as hard clays, are hard, dense and resistant to weathering. Most of such clays break with a conchoidal or shell like fracture. Their plasticity and drying shrinkages, after they have been ground and mixed with water, are very low; their firing shrinkages are moderately high and somewhat variable. The best clays of this type are low in impurities and are highly refractory, having a PCE of cone 33 to 34-35. Deposits of flint and semi-flint clays occur in rather limited areas in Pennsylvania, Maryland, Kentucky, Ohio, Missouri, and several other states.

Soft Clay Properties

Semi-plastic and plastic refractory clays, often called soft clays, vary considerably in refractoriness, plasticity and bonding strength. Drying and firing shrinkages are usually fairly high. The PCE of clays in this type ranges from cone 30 to cone 33 for the most refractory varieties, and from cone 26 to cone 30 for many clays of high plasticity and excellent bonding power. Certain clays with a PCE which is even lower, are widely used for special purposes. Important deposits of semi-plastic and plastic refractory clays occur in Pennsylvania, Ohio, Kentucky, West Virginia, Maryland, Alabama and in various other states.

The pure kaolins are usually moderately plastic having extremely high drying and firing shrinkages; solicious kaolins have much slower shrinkages. The most refractory kaolins have a PCE of cone 33 to cone 35; less pure varieties with a PCE of cone 28 to 32 are fairly common. Among the largest deposits of refractory kaolin are those which occur in Georgia.

Fireclay brick are sometimes made of a single clay, but more commonly of a blend of clays. Flint clays and high grade kaolins impart high refractoriness; plastic clays facilitate forming and impart bonding strength; calcine clays are used to control the drying and firing shrinkages. The relative proportions of these in a blend will be depended upon the character and quality of the ware to be made.

Fired clay brick are usually made by one of three methods, namely, hand molded, stiff mud, or power press.

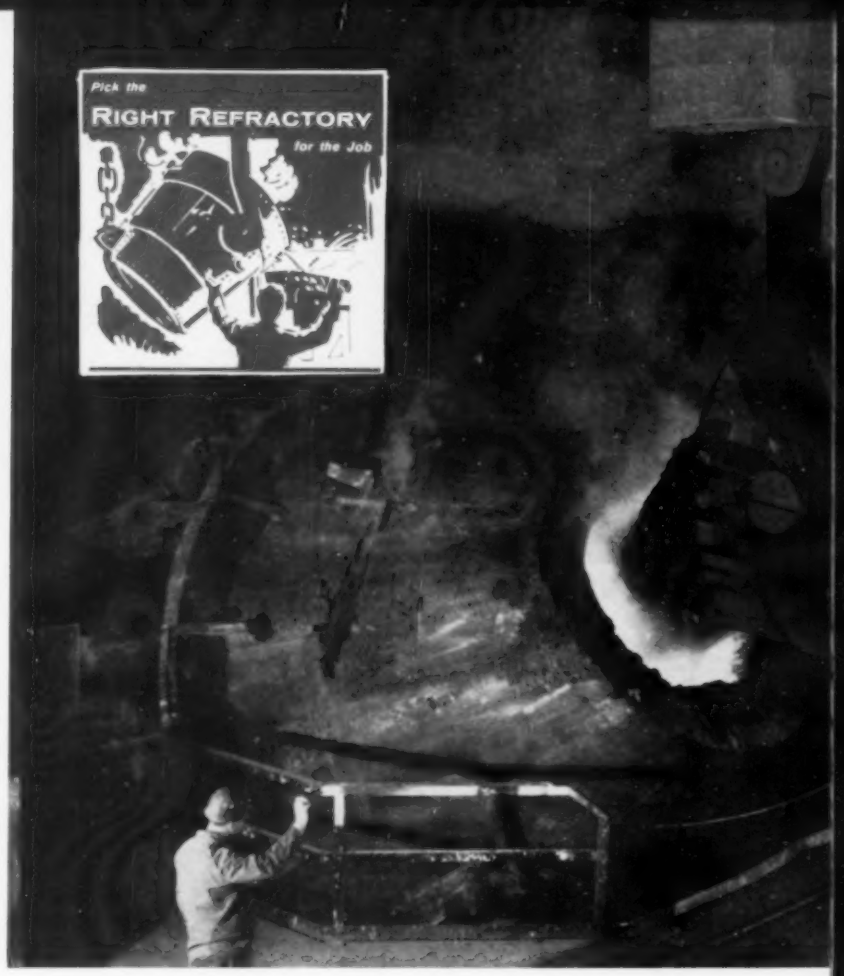
Special Forming Processes

Since fireclay refractories must meet a variety of service conditions, it is often necessary to make them by special processes in accordance with such demands.

Slip casting is sometimes used in making clay refractories when required shapes are unusally intricate or have extremely thin sections. The finally ground refractory ingredients of the mix are made into a slip, or slurry, by the addition of water and small amounts of certain chemicals which increase the fluidity of the slurry. The slip is poured into a plaster of Paris mold which is removed after the initial hardening of the shape takes place, leaving the cast shape ready for drying and burning.

Air ramming is a hand molding

(*Continued on page* 103)



Basic oxygen steel furnace

Basic Refractories

Harbison-Walker Refractories Co.

Basic refractories are those formed from magnesite, chrome ore, olivine or combinations of magnesite with chrome ore, alumina or other oxides. Preformed shapes may be either chemically bonded or fired in a kiln to develop a ceramic or crystalline bond, both having properties of stability at high temperatures and resistance to basic slags. Basic refractory products are also supplied as refractory grain and the grain with suitable additives to meet the numerous and varying requirements.

Basic brick are formed with high pressure in hydraulic or mechanical presses. The mix generally consists of ground, sized and blended dead burned magnesia and/or chrome ore and olivine with the necessary bonding agents. After forming, the brick are dried in controlled-humidity driers. In the case of chemically bonded brick, the bond is developed during the drying operation, whereas, a fired brick will later be subjected to a rigidly controlled soaking heat to develop the bond between grains. In service, the chemically bonded brick undergoes changes giving it characteristics approaching and sometimes surpassing its fired counterpart.

Numerous Applications

The applications of basic refractories are numerous, covering almost all types of industries. The biggest user of basic refractories is the steel industry in their operation of basic open hearth furnaces. Modern open hearth operation requires a complete furnace of basic refractories in which the steel is refined. The hearth on which the steel is made generally employs a subhearth of fired chrome-magnesite or preferably hydration resistant magnesite brick on top of which is rammed a high purity magnesia working hearth. The walls are constructed of fired or chemically bonded metal-encased chrome-magnesite or magnesite-chrome brick. Although silica brick was the mainstay for open hearth roof construction since the inception of this type of steel-making, the last few years has shown an unprecidented swing to chemically bonded metal-encased magnesite-chrome and chrome-magnesite compositions. The charging doors are generally lined with a monolithic material such as air-setting chrome ore. The port ends of the basic open hearth are built of chemically bonded metal-encased chrome-magnesite or magnesite-chrome brick. With increasing higher operating temperatures, the use of basic refractories is being extended to the uptakes and regenerator checkers. The uptakes generally employ the same compositions as the port ends whereas, the leading basic regenerator checker is a forsterite refractory.

Maintenance

Necessary maintenance to the basic open hearth is accomplished on the hearth with dolomite or grain magnesite materials. Maintenance to the basic walls can be made with chrome, magnesite or mixtures of chrome and magnesite gunning materials.

Another important steelmaking process, the electric furnace, uses a good percentage of the basic refractories produced utilizing much the same types as the basic open hearth in bottoms and sidewalls. The sidewalls, however, are constructed almost exclusively of metal-encased magnesite-chrome brick.

The newly developed basic oxygen steel process requires altogether new refractories from those used in the open hearth or electric furnace and consist of tar-bonded dolomite-magnesite or tar-bonded high lime-magnesia clinker for the working lining and fired magnesite brick for the tank lining. The future of this process looks extremely bright and refractories development for this application is receiving particular research attention.

Other applications of basic refractories in the steel industry are in lower sidewalls of soaking pits, the many types of heating furnaces where high resistance to penetration and attack of molten scale is necessary.

Nonferrous Metals

Nonferrous metals also require the extensive use of basic materials such as copper reverberatory smelting furnaces. These furnaces employ magnesite brick and metal-encased magnesite-chrome brick in both the lower and upper sidewalls. Many of these furnaces are provided with suspended arches in chemically bonded metal-encased magnesite-chrome brick. The copper holding and anode furnaces are of similar construction to the reverb, whereas the convertors are lined with fired chrome-magnesite or magnesite brick for best results.

In the smelting and refining of lead, the use of fired magnesite brick

(*Continued on page* 96)

Silica Refractories

A. P. Green Fire Brick Co.

Silica brick are fired refractories consisting essentially of silica (SiO_2), and are usually made from quartzite or quartz pebbles with a small percentage of hydrated lime added as a bond.

Silica brick have a number of desirable properties:

1. The ability to carry a substantial load to within a few degrees of their cone fusion temperature.
2. A high resistance to attack by iron oxide and lime.
3. Freedom from shrinkage at high temperatures.
4. High thermal shock resistance in the range of 1200° to 3000° F.

A serious limitation to the more widespread use of silica brick, however, is their sensitivity to thermal shock below 1200° F.

Silica brick have been manufactured in the United States for over 90 years and, while the formulation of the brick during these early days was very similar to that used today, there have been many improvements over the years.

These improvements are primarily related to:

(a) A better understanding of the nature of the silica minerals and their behavior under varying conditions of time, temperature, and pressure; and

(b) Advancements in the physical methods of manufacture.

The most rapid strides have been made in the past 20 years, largely through the application of new knowledge relative to silica materials. An example of this was the recognition of the influence of impurities, particularly alumina and alkalies, on the quality of silica brick.

Classification

A.S.T.M. tentative classification (C416-58T) is limited to silica brick meeting the following requirements:

Alumina content	1.5% maximum
Titania	0.2% maximum
Iron Oxide	1.0% maximum
Lime	4.0% maximum
Modulus of Rupture	500 psi minimum

Within this range, silica brick are classified on the basis of impurities by the use of a "flux factor". This flux factor equals the percent of alumina plus twice the percent of alkalies.

Type A (super duty) are those with a flux factor of 0.50 or less, and Type B (standard) are all others falling within the scope of this classification.

Chemical Purity

The quality of super duty silica brick, insofar as chemical purity is concerned, has very nearly reached the ultimate. Pure silica melts at approximately 3110° F. and the more pure brands of silica brick manufactured today do not fail under heavy loads (50 psi) until temperatures of 3080° F. are reached.

Since further improvements in the chemical purity of super duty silica brick will be quite minor, efforts have been directed toward improving the physical properties, while keeping the chemical purity at its present high level. In other words, the thought is that physical properties now become the determining factor for better overall quality.

In the recent past, silica brick have been used having densities of not much more than 105 lb./cu.ft. and apparent porosities of 25% and more. The trend, however, is to brick having densities around 108-112 lb./cu. ft. and apparent porosities around 20%-24%.

Another important factor which will be given increased emphasis is uniformity of quality, which can only be achieved through a high degree of quality control.

That improvements in physical methods of producing silica brick have been made at a rapid rate over the past few years is very evident in the use of:

(a) Elaborate beneficiation plants to achieve the ultimate in pure raw materials

(b) A great deal of precaution to

(*Continued on page* 106)

High Alumina Refractory Brick

North American Refractories Co.

Although the value of alumina as a refractory material has long been known it was not until around 1920 that commercially satisfactory high alumina brick were produced. Diaspore, a naturally occurring mineral found associated with flint clay in Southern Missouri was the principal raw material. Diaspore is the monohydrate of alumina and in its raw form contains approximately 70 to 80% alumina. This source of raw material gave the Missouri producers a decided economic advantage which they enjoyed until the supply of diaspore approached depletion shotly after World War II. At about this time there was a gradual transistion to the use of bauxite ($Al_2O_3 \cdot 2H_2O$) for the production of high alumina refractories. Since the principal source of refractory bauxite is South America, the economic advantage of the Missouri producers largely disappeared and brought about a more widespread distribution of production.

ASTM Classification

For a long time A.S.T.M. classified these brick as Alumina-Diaspore Fireclay Brick and recognized three subclasses as 50, 60, and 70% alumina. The general use of bauxite permitted the addition of an 80% alumina brick to this group. More recently the availability of nearly pure alumina grain will probably result in the standardization of brick containing 85, 90, and 99% alumina. Brick of these three compositions are already on the market.

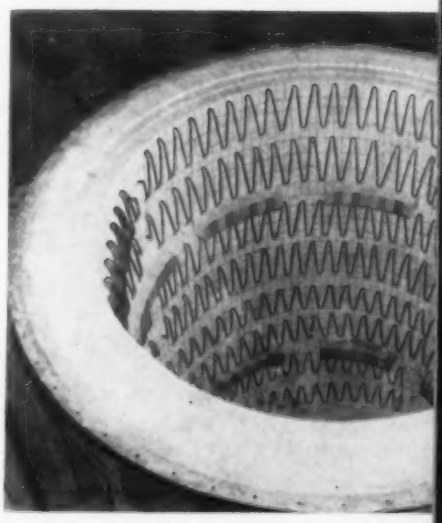
High alumina brick of the types described above should not be confused with that class of brick usually referred to as "mullite" brick. Although the alumina content of mullite brick is within the range for high alumina brick, they have certain properties that warrant their classification as Special Refractories.

Production Methods

High alumina brick are formed principally by the dry press process but almost every other method of refractory production is used including air hammer, tamping press, hand molding, and in a few cases the stiff mud process. Higher pressing pressures are used in dry pressing high alumina brick than is general for fireclay brick. This is made necessary by the high percentage of calcined bauxite in the mix. Distribution of grain sizes must also be given careful attention in order to produce brick with reasonably low porosities. Special firing temperatures or schedules are not usually required. Most high alumina brick therefore are fired along with high duty or super duty fireclay brick in either tunnel or down draft kilns. Firing shrinkages of high alumina mixes are very low and therefore kiln losses and size uniformity are usually favorable.

High refractoriness is probably the most important characteristic of high alumina brick with refractoriness increasing approximately in proportion to alumina content. Certain other properties do have an influence on the usefulness of high alumina brick for specific applications although it is extremely difficult to generalize concerning properties. As a group, high alumina brick are likely to have comparatively high porosities i.e. in the range of 20 to 30%. They have good slag resistance, particularly to basic slags, and are excellent in their ability to carry loads at high

(*Continued on page 75*)



Insulating Refractories

Armstrong Cork Co.

Installing rotary cement kiln lining of insulating firebrick laid in a 1/8-inch bed of refractory cement. Face of brick that is in contrast with preceding brick is dipped in refractory cement before application.

Insulating firebrick is available in variety of shapes, including anchor brick, radiant tube tile, ledge block, terminal tile and roll tile.

Top view of interior of controlled atmosphere hardening furnace for hardening rocket motor cases and aircraft components which is in operation at Lindberg Steel Treating Co.'s Melrose Park plant near Chicago. Furnace is lined with lightweight insulating refractory made by Armstrong Cork Co.

Insulating fire brick did not come into being until early this century but today they are a necessity to economical and efficient operation in a wide variety of high temperature applications.

Insulating fire bricks are used to help reduce heat loss, improve production and quality and lower construction and maintenance costs. They serve both as a fire brick and an insulation.

They are used directly exposed as refractory linings in equipment fired with gas, oil or powdered fuel, where they also provide valuable extra resistance to heat loss through constructions. Also used as back-up insulation behind a heavy duty refractory lining where the lining is subject to severe conditions such as mechanical abrasion, they add thermal efficiency and stability to the equipment.

Highly Formulated

For maximum performance and long service life, these insulating refractories must be highly formulated to provide high insulating efficiency and strength. Top quality insulating refractories are formulated from selected refractory clays, carefully blended and fired. Air spaces within the brick not only add to the insulating efficiency but also reduce weight. They must be light enough to absorb little heat, yet strong enough to have high resistance to mechanical shock. There are several grades of insulating fire brick for different temperature ranges. Arm strong Cork Co. has a line of six bricks for temperatures ranging from 1600° to 2800°F.

Insulating refractories are used in such metal working applications as blast furnace mains, blast furnace stoves, coke ovens, core drying ovens, ducts, flues, mains, forge furnaces, galvanizing tanks, heating furnaces, heat treating furnaces, melting furnaces, regenerators, recuperators and waste heat boilers; in ceramics and glass industries applications such as ceramic kilns, enameling furnaces, gas producers, glass annealing lehrs, glass bending furnaces, glass melting tanks and forehearths; in the petroleum industry in air and gas heaters, oil heaters and stills and reactor chambers; in the chemical industry, in calcining furnaces, sulphur furnaces and high temperature pressure vessels; in power plants in oil and gas fired, coal fired and waste heat boilers and breaching and ducts, and in such general industry applications as domestic oil burners, incinerators and stacks.

Insulating fire bricks offer many advantages, with new techniques involving their use being revealed constantly. Sufficiently high crushing strength of these fire bricks makes possible the use of these insulating refractories as single layer kiln liners, replacing the heavy fire clay brick traditionally installed for this purpose in Portland rotary cement kilns. Use of insulating fire brick provides higher, more uniform mix temperatures resulting from reduced heat losses. This permits formation of the clinker with less heat, since the mix enters the clinker zone at a higher temperature. Where waste heat boilers are used, the higher temperatures of the exit gases in kilns insulated with these brick result in further economies. Lower shell temperatures result in cooler operation of bearings and gears, thus prolonging their life.

Periodic Kilns

In periodic kilns used for firing of structural clay products the operating and thermal efficiency can be greatly improved by the use of insulating fire brick in construction of both crowns and sidewalls. In both circular and rectangular kilns, use

(*Continued on page* 104)

Mullite Refractories

H. K. Porter Co., Inc.

Mullite refractories fall into the broad alumina-silica classification which includes all the fire clay and high alumina categories. Mullite refractories differ from others in this group principally because they are the only ones consisting predominantly of large, well-defined mullite crystals. In addition, they usually are compounded from mullite grain, whereas other refractories in this classification normally are made from clays or high-alumina materials, either singly or in various combinations.

Raw Materials

The mineral mullite is the only high-temperature stable compound resulting from the reaction of alumina and silica. Its formula is commonly expressed as $3\ Al_2O_3$—$2\ SiO_2$. Any mixture of alumina and silica will form some mullite if heated to a sufficiently high temperature. Mullite is rarely found occurring naturally and there are no commercial deposits. Mullite for the production of refractories is made by the high temperature calcination of the sillimanite group of minerals, principally kyanite and sillimanite, or by the heat treatment of carefully compounded blends of alumina and silica.

In the early days of mullite refractories production, about 1926, kyanite from India was the prime raw material. Later, kyanite and sillimanite from other localities were used. In recent years and today, synthetic mullite of high purity is the preferred starting material for manufacture of this refractory. The advantages of using synthetic grain are obvious; the grain can be compounded for desired chemical and physical characteristics of uniform quality to produce specialized and improved refractories. Synthetic mullite mixtures are fused in electric furnaces or are sintered in other conventional furnaces such as rotary kilns. The sintered type of grain is the more widely used.

Mullite refractories are made by conventional methods. These include power pressing, air ramming and slip casting. The processing steps of crushing, grinding, screening, blending and tempering, forming, drying and burning are those common to other segments of the refractories industry. In each method of forming, however, emphasis is placed on controlled screen sizing to achieve desired properties. Further, in the power pressing method, extreme pressure is used. All formed mullite products are burned at exceptional high temperatures (about 3000°F.) compared to other alumina-silica refractories.

The properties of mullite refractories in recent years have been "tailored" more and more toward specific applications. There are certain properties, however, that are the basis of mullite's expanding use. They are:

(1). Excellent thermal spalling resistance,

(2). Exceptional volume stability under conditions of soaking heat at elevated temperatures, and

(3). High temperature of failure under load.

Typical chemical and physical properties for mullite brick and specialties are given in Tables I and II which accompany this article.

Although mullite refractories are often used to build entire structures, the principal type of application results in partial linings, specific spot installations, etc., to achieve a balanced furnace life for overall refractories economy. Specific product and furnace applications where mullite is used advantageously are as follows:

Ajax electric furnaces; Detroit furnaces; aluminum melting furnaces; carbon black furnaces; heating furnace hearths; melting crucibles; ceramic setting tile; high tem-

I. Typical Chemical and Physical Properties of Three Different Types of Mullite Brick

		Regular	Slag Resistant	Spall Resistant
Chemical Analysis				
Silica	(SiO_2)	29.82	31.35	30.32
Alumina	(Al_2O_3)	68.18	66.09	67.22
Ferric Oxide	(Fe_2O_3)	0.37	0.70	0.53
Titania	(TiO_2)	0.73	0.86	0.93
Calcium Oxide	(CaO)	0.12	0.22	0.22
Magnesia	(MgO)	0.28	0.02	0.02
Alkalies	(Na_2O-K_2O)	0.47	0.62	0.60
Modulus of Rupture (p.s.i.)		2450	3535	1750
Bulk Density—gms/cc (B.S.G.)		2.37	2.52	2.40
	oz./cu. in.	1.37	1.46	1.39
	lbs./cu. ft.	148	158	150
Apparent Porosity, %		23.0	16.0	20.5
Linear Reheat Change, % 5 hrs. @ 1700°C (3000°F)		—0.87	—0.9	—0.3
Load Deformation, % 25 p.s.i. @ 1650°C (3000°F)		—1.5	—2.8	—3.1
Panel Spall Loss, % 1650°C (3000°F) preheat		4.5	——	0.7

II. Chemical and Physical Properties of Mullite Specialties

	Mortar	Ramming Mix	Castable
Pyrometric Cone Equivalent (PCE)	38+	38+	38+
Maximum Operating Temperature	3200°F	3150°F	3100°F
Maximum Grain Size		6 mesh	3/8"
Chemical Analysis			
Silica (SiO_2)	29.20	31.50	27.52
Alumina (Al_2O_3)	67.60	64.70	67.75
Ferric Oxide (Fe_2O_3)	1.50	1.19	0.52
Titania (TiO_2)	0.86	0.99	0.84
Calcium Oxide (CaO)	0.04	0.12	2.75
Magnesia (MgO)	0.12	0.24	0.13
Alkalies (Na_2O-K_2O)	0.36	0.74	0.46
Fired Modulus of Rupture			
220°F	Under 50		
2550°F	700-800		
2750°F	1100-1300		
Modulus of Rupture p.s.i.			
220°F		200-300	600-700
1000°F		125-225	550-650
1550°F		375-500	850-900
2000°F		———	650-750
2550°F		2300-2500	550-650
3000°F		3600-3900	1500-1800
Cold Crushing Strength, p.s.i.			
220°F		450-750	1500-1750
1000°F		300-560	1400-1650
1550°F		900-1200	2000-2350
2000°F		———	1600-1875
2550°F		5200-6250	1400-1600
3000°F		8900-9500	3800-4500
Reheat Change, %			
220°F		0.00	0.00
1000°F		0.00	0.00
1550°F		0.00	0.00
2000°F		——	0.00
2550°F		0.00	0.00
3000°F		—0.8-1.2	0.50
Weight per cubic foot installed		145#	
Weight required per cubic foot of work			120
Gals. of water required per 100 lbs.			2-1/3
Amount required to dip 1000 brick	300-400#		
Gals. water for dipping consistency	4 1/2/100#		

perature furnaces; calciner burner blocks; electric furnace lower arches; port sleeves; low frequency induction furnaces; high frequency induction furnaces; high temperature tunnel kilns; vertical shaft kilns; pelletizing kilns, and grate area in power boiler.

There is a trend toward increased use of mullite in installations where other alumina-silica brick have previously been used. The latest development in mullite use is its application for the blast furnace stove side walls, domes, combustion walls and upper checkers. It also is expected that within the not too distant future mullite will be seen in blast furnace linings. Refractory engineers in Europe and India are now experimenting with mullite for these purposes.

High Alumina . . .

(*Continued from page 72*)

temperatures and in their resistance to spalling.

A characteristic of most high alumina brick is their tendency to expand slightly under service conditions. Unless this expansion becomes excessive, this property is conducive to good service results as it tends to keep the lining tight and prevent joint erosion and slag attack.

High alumina brick are very versatile from a service standpoint and their application extends over almost the entire field of industrial furnaces. Frequently they are used to bolster up vulnerable sections of furnaces but are also used for complete linings of many different types of furnaces.

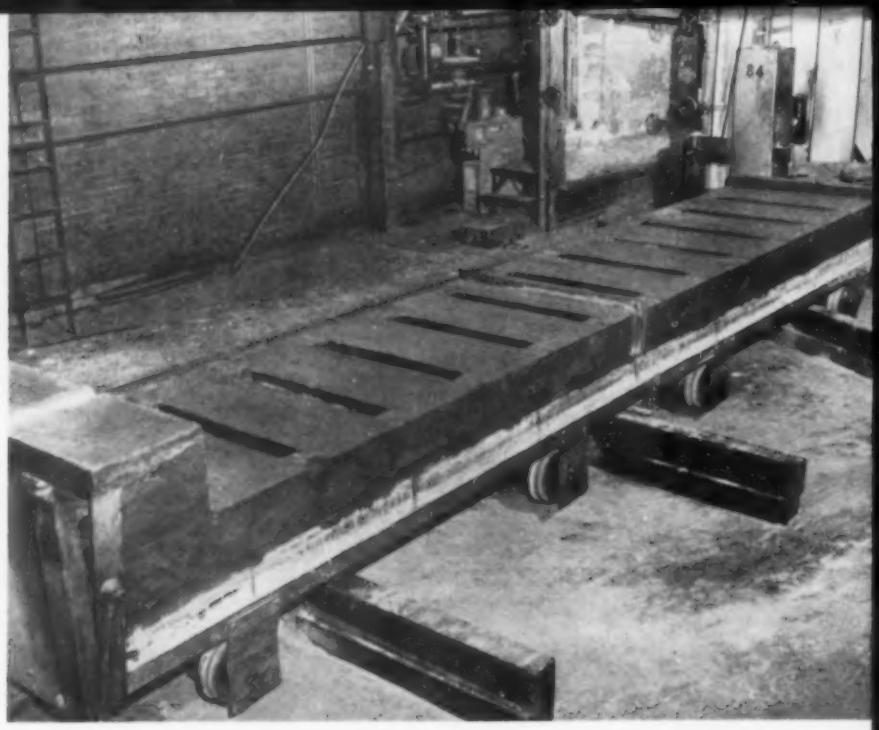
Brick of the 50% Al_2O_3 type are reasonably close in refractoriness and physical properties to the better grades of super duty fireclay brick now on the market. For this reason the sale of 50% Al_2O_3 brick is quite limited. Most consumers have found that in those services too severe for super duty brick it is to their advantage to use 60% Al_2O_3 brick to get a greater factor of safety. However, they are used to advantage in the intermediate zone of rotary cement and lime kilns, in high duty boilers and metallurgical furnaces.

One of the principal uses for 60% Al_2O_3 brick is in marine boilers. They are also used extensively for malleable iron furnace bottoms, reheat furnace roofs, fantail arches in open-hearth furnaces and in the intermediate and transition zones of rotary kilns.

70 % Al_2O_3 Brick Versatile

Probably the most versatile of the high alumina brick is the 70% Al_2O_3 class. It is used in the burning zone of many cement and lime kilns. In those kilns using basic brick in the burning zone it is good practice to use a band of 70% Al_2O_3 brick on either side of them. The use of 70% Al_2O_3 brick for electric furnace roofs is increasing and is now considered a standard refractory for this service. Other uses include all types of metallurgical furnaces using basic slags such as lead drossing furnaces and brass melting furnaces. Seventy per cent (70%) Al_2O_3 refractories are frequently specified for burner blocks and other special shapes because of their refractoriness, resistance to spalling and slag attack. This is a very incomplete list of the service applications of 70% Al_2O_3 brick.

As furnace temperatures increase and greater refractoriness is required of the linings, recourse is had to those brick of 80% Al_2O_3 and higher. In addition to their ability to stand higher temperatures they have many other valuable properties such as spalling resistance, slag resistance, and the capability of carrying heavy loads at high temperatures without deformation of slumping. The use of high alumina brick above the 70% Al_2O_3 grade is largely confined to vulnerable sections of furnaces and to those processes in which refractory materials other than alumina contaminate the product. A good example of this type of service is in aluminum melting furnaces.



Cartops of all types in iron and steel, building brick and other industries are being constructed of refractory specialties as indicated in this steel mill cartop photo.

Plastics and Castables

J. H. France Refractories Co.

The past 10 years has been one of tremendous growth for specialty refractories. This fact is borne out quite graphically by U.S. Department of Commerce surveys on the refractories industry and is further substantiated by statistical data compiled by government departments and industrial associations on the varied industries consuming refractory products.

While there are varied and sundry interpretations of the term "specialty refractories", quite generally within the industry, this term is applied to such items as refractory castables, plastic firebrick, high temperature mortars, ramming mixes, surface seals, coatings and other miscellaneous refractory products.

Primary among the many types of specialty products that have found their way into the marketplace are refractory castables, plastic firebrick and ramming mixes. Refractory castables are hydraulic setting cements that can be easily cast into special shapes or cast or gunned into complete monolithic linings. Plastic refractories termed in some quarters "Plastic Firebrick" and in others used to include any moldable refractory of a granular consistency, are usually considered, within the refractory industry, that refractory material which is tempered with water and is supplied in a moist granular consistency of such workability that it can be tamped into place for either special shapes or complete walls. Again, the advantage of a monolithic or one-piece structure is gained. This too is true of ramming mixes of all types. Ramming mixes are refractory materials designed and tailored to be rammed into complete hearths, for ladle application, for runners, spouts and similar locations or for special shapes application.

The history of monolithic or 1-piece linings or shapes is simply one of economics whether the job be of castable, plastic or ramming mix construction. Automated production, increased costs of manufacture, higher temperatures, newer metals, modernistic furnace design and other modern technological advances have all effected a decided shift in refractory demands as well as additional demands on refractory products.

While monolithic linings cannot be interpreted as substitutes for refractory brick, monolithic materials can be of advantage where downtime, inventory reduction, or lowered maintenance costs are required.

Assume, for example, that a furnace must be taken down for emergency repair. Upon consulting the refractory manufacturer, the purchasing agent finds that because of its special shape, the item or items needed for repair will take several weeks for delivery, since it is not a commonly stocked brick. Another solution is then needed to reduce downtime and put the furnace back into immediate operation. Quite often a refractory castable, plastic firebrick or ramming mix can provide the solution to the problem.

Inventory Problem

Another factor which has lead to the growth in specialty sales is the inventory problem. In attempting to maintain a realistic inventory, management is continually surveying the problem. With the use of castables, plastics and ramming mixes, the need for a heavy inventory of special shapes is eliminated, since special shapes can be easily cast "on the job" when needed of refractory castable, and tammped or rammed with plastic firebrick or ramming mixes.

Too, though initial costs are generally higher than brickwork construction for new furnaces, the low

(Continued on page 97)

Special Refractories

The Carborundum Co.

In an era of demand for unusual materials, new applications of specialized refractories have developed at an accelerated pace. Their properties and design flexibility afford countless possibilities as materials of construction and as equipment components.

Following by some fifteen years Dr. Edwin Goodrich Acheson's discovery in 1891, silicon carbide became the first member of the specialized refractories group. Additions made meanwhile include such other electric-furnace products as aluminum oxide, mullite and magnesia. More recently, zirconia and various carbides, borides and nitrides have materialized. Many more are under investigation and evaluation.

During this period, manufacture of electric-furnace refractories has become a multi-million dollar industry with real prospects of appreciable expansion. In a comparatively short span of years their use has made practical a number of processes. They also literally effected a revolution in the ceramic field by providing furniture capable of fulfilling tunnel kiln requirements and resulting in greater output of better quality wares at lower costs.

These products obviously offer a broad range of characteristics. Silicon carbide refractories, for example, conduct heat rapidly; resist thermal shock, elevated temperatures, corrosion and abrasion; and carry heavy loads without deforming. Refractories produced from aluminum oxide "bubbles", on the other hand, provide good insulating qualities at temperatures that cause failure of other refractory insulations, support moderate loads, withstand attack by most acid and mildly basic environments and form lightweight structures.

Characteristics

Despite their importance, space limitations preclude detailing all properties of all products in this category. Emphasis, however, must be placed on the fact that only infrequently is one of these refractories selected solely for its heat resistance. Most applications make use of two or more characteristics which points to the need for considering all requirements of an installation when choosing a refractory part of lining.

The principal ingredients in specialized refractories are granular of predetermined mesh sizes. These grains are mixed with bonding agents, formed to shape and size and then kiln-fired. Usually, clay-and glass-type bonds are employed. Some compositions use a silicon nitride bond while others are self-bonded.

Bonds in themselves serve important functions even though they normally constitute only a relatively small percent of a given composition. They help hold the grains together before, during and after firing; provide protection for granules susceptible to atmosphere attack; reduce permeability by filling interstices; and enable enhancement of certain product properties where desired. Even the self-bonded varieties of refractories use a temporary bond that burns out on firing.

Brick and shapes are formed in all-wood, metal and wood and all-metal molds either on mechanical presses, by hand using power tools, vibration pressing and casting. Shape quantity, dimensional accuracy required and intricacy of design govern kind of mold selected. The latter becomes significant when realizing that parts must be held to close tolerances; subsequent grinding and finishing are impractical except in rare instances.

Firing occurs in both continuous and batch-type kilns at temperatures of about 2650 F (cone 16 down) up to over 3200 F (cone 35), either with or without special atmospheres.

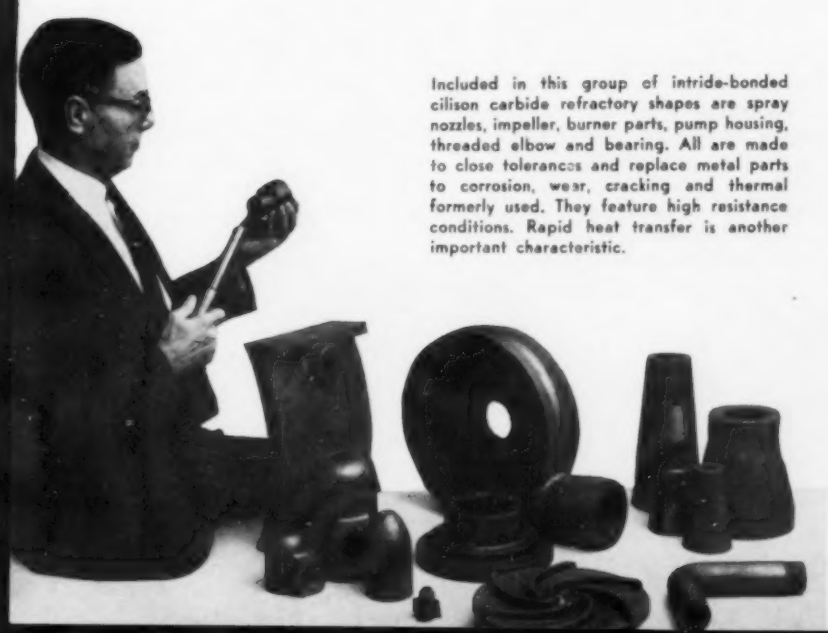
Other Specialties

Another segment of the specialty group embraces refractories manufactured by melting raw materials, pouring the melt into molds and annealing finished shapes. These highly vitreous products offer extreme resistance to corrosion and erosion such as found in glass tanks.

From the foregoing it is evident that specialized refractories are well-named. This specialization also carries over to their application in the furtherance of which few specific rules can be established.

In general, these products find use where natural-mineral-type materials, for one reason or another, are incapable of performing satisfactorily; where their unusual properties are essential to economical process operations; and where metal alloys are unfitted for service requirements. Although some applications require them in quantity, usage in the majority of installations is limited to severe service areas or to those loca-

(*Continued on page* 96)



Included in this group of intride-bonded cilison carbide refractory shapes are spray nozzles, impeller, burner parts, pump housing, threaded elbow and bearing. All are made to close tolerances and replace metal parts to corrosion, wear, cracking and thermal formerly used. They feature high resistance conditions. Rapid heat transfer is another important characteristic.

PACKAGING

TO THE MAN

Interested in Expediting Final Product Handling

Here's what companies in the industry do to solve the age-old problem of handling.

West Brothers Brick Uses Platform:

Unload 18,150 Brick Per Man in a 6-Hour Day

West Brothers Brick Co., Fairmount Heights, Md., a suburb of Washington, was faced with the problem of unloading 159 kiln cars per week without increasing their labor force to overwhelming proportions, and without having to work too much overtime. With a 5-day work week in sight for the unloading crews, management set out to solve the problem and, after much experimentation, arrived at the solution.

The solution consists primarily of an unloading platform built over the three return tracks for the kiln cars. The company already had several lift trucks and the platform was built with sufficient width to allow the lift-trucks to maneuver. Height of the platform was such that it cleared the empty kiln car by several inches.

Move Cars by Tractor

Loaded kiln cars are moved within two car lengths of the platform by a garden tractor. A hand-operated winch which is operated by the hacker moves the car into final position for unloading. The unloader then stands on the platform, which is also a convenient height for him to work, and hacks the brick into jigs.

Using this method, two men on each track unload 11 cars per day in from 6 to 6½ hours. With each car holding 3300 brick, these two men unload 36,300 brick, or 18,150 per man. Working six hours per day, the rate is a phenomenal 3000-plus brick per hour. The operation has been pinned down to a 5-day week and all overtime has been eliminated from this operation.

Cubes Contain 700 Brick

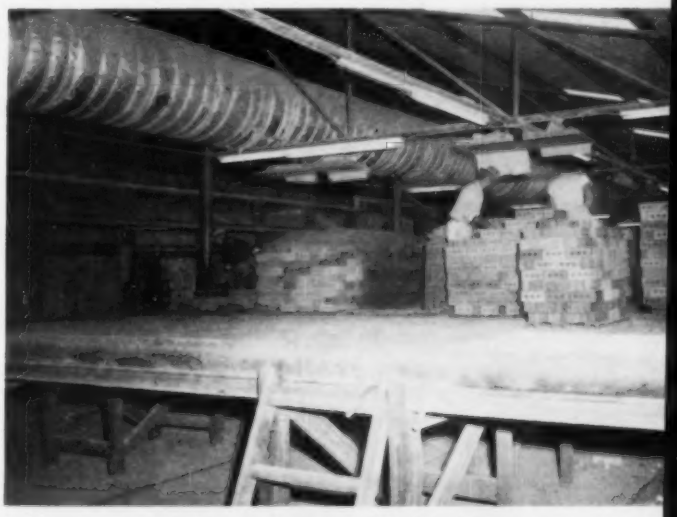
Brick are hacked into cubes containing 700 brick. Lift trucks then remove the packages from the hacking area to either a burned storage area or a strapping area. The package is made so that it can be conveyed to either of these areas without strapping at the hacking locations. Six men, working on three tracks, keep two lift trucks busy, shuttling their loads between the storage areas and the hacking stations.

Brick are strapped according to customer preference. In one particular instance, Norman brick were loaded on pallets, then strapped. The customer provided the pallets so no return program had to be worked out by the manufacturer. Other customers desire a palletless package and many of the company's customers still prefer receiving the brick in loose shipments. The package which West Brothers Brick Co. has developed adapts itself to all three methods of shipment.

1 Unloading platform straddles three return tracks and is of sufficient width to allow lift truck operation. Notice 8-inch pipe serving as bumpers along perimeter of platform.

2 Kiln cars are delivered to unloading platform where brick are hacked into jigs. Elevation of platform is such that car clearance is about four-inches. Notice winch at right used to move cars into position for hackers.

3 (above). Brick are hacked from the car into cubes containing 700 brick. Finger brick are placed transversely (contrary to most operations) for handling with hydraulically operated forks.



4 (above). Three hacking stations are provided for kiln-car unloaders. Two men working on each track unload eleven cars containing 3300 brick each in from 6 to 6½ hours.

5 (below). After the 700-brick pack has been made, a lift truck removes the pack from the setting area to an outside storage or strapping area. A ramp built on the outside of the kiln-building permits easy lift-truck access to the setting platform.

6 (below). Norman brick are handled the same way as standard brick, with the package containing 140-brick. Here the brick have been placed on pallets as per customer's request.

Jackson's Miss-Lite

Expanded Clay Aggregate Meets Demands of South

Rigid Quality Control Stressed By Mississippi Manufacturer

With a demand for lightweight aggregate in Mississippi and with no aggregate available other than slags from the Birmingham area, one of the state's leading producers of ready-mix concrete entered the clay processing industry and today is enjoying success manufacturing Miss-Lite.

Miss-Lite is the trade name for the lightweight expanded clay aggregate produced by Jackson Ready-Mix Concrete of Jackson, Miss. It is produced in a modern plant under rigid quality controlled standards. It is a structural-quality ASTM specification aggregate manufactured by the rotary kiln method, for the specific purpose of providing top-quality aggregate for all lightweight applications. Miss-Lite is derived directly from one of Mississippi's most read about natural resources—Yazoo Clay.

From clay pit to finished Miss-Lite product, manufacturing procedures include numerous check control sampling and testing by hourly sampling of clinker, gradation, and car loading. Miss-Lite aggregate is further checked, as the customer would receive it, by sampling and testing daily shipments to the company's own concrete manufacturing operations.

Modern laboratory equipment, operated by experienced personnel, assures maintaining of product quality control. Where needed, the company's product control engineer is available to advise and assist the customer, be it engineer, architect or contractor, in proper utilization of the aggregate for application.

Clay is prepared for the rotary kilns in wet weather by extruding 3½-in. dia. slugs through this American pug mill-extruder.

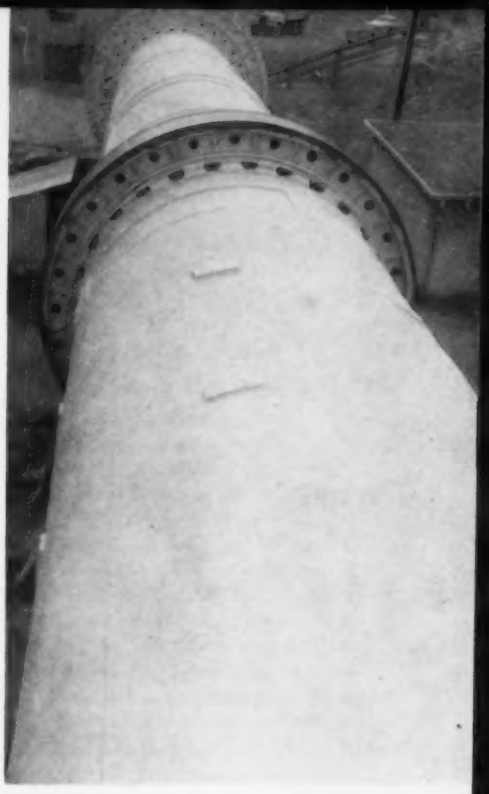
500 Year Supply

Located on a 700-acre site six miles northwest of Jackson, the Miss-Lite plant is directly adjacent to the raw clay. Geological reports indicate a 500-year supply of raw materials immediately available to the plant. The Illinois Central Railroad provides a 24-car storage siding for the company at its shipping point, Cynthia, Miss.

Clay for the operation is obtained by using a dragline equipped with a two-yard bucket. Indications are that the clay goes down to a depth of 460-ft. and for this reason, the step-method is used in mining the clay. Three 12-yd. trucks are utilized in hauling the clay from the clay pit, which at the time of the writing was 110-ft. deep, to the 70-ft. by 120-ft. covered clay storage building. A crawler mounted tractor is used for stripping the 8-foot overburned and to maintain the floor of the pit. A motor-grader is used to maintain the benches in the pit and maintain the haul roads from the pit to the plant.

From the clay-storage shed, a front-end loader delivers the raw clay in-

Clay for the operation is obtained by using this Link-Belt Shovel equipped with a two-yard bucket.



The rotary kiln is ten-feet in diameter and 200-feet long and travels at about one rpm. 2½ hours is required for the material to be bloated.

to either of two machines, depending upon local weather conditions. In normal weather, the clay is delivered to a pug mill for pre-sizing of the clay down to pieces about 2½-in. size. In abnormally wet weather the clay is delivered to a combination pug-mill extrusion machine equipped with de-airing attachment and extruded through a plate die containing twelve 3⅛in. openings. These 3⅛-in. columns of clay as they are extruded from the machine are then allowed to break off by their own weight onto the 24-in. belt conveyor which discharges into the feeder pipe for the rotary kiln.

Variable Speed Drive

The rotary kiln, with a variable-speed drive, is ten-ft. in diameter and 200-ft. long. Traveling at the rate of approximately one rpm, a total time of 2½ hours is required for the clay to travel the length of the kiln. In this time it is burned to an approximate temperate of 2000 degrees F. to a point of incipient fusion. This process burns out organic matter and explodes interior gases of the clay to create a light cellular clinker. The kiln is fired with natural gas. Because of good combustion conditions created by the fuel, no draft fans are necessary on the kiln. A six-foot by 100-ft. stack is employed to create proper draft conditions. Also unusual in this operation is the fact that no dust collectors are necessary because of the unusual cleanliness of this particular operation.

The hot clinker from the kiln is discharged over a grating made up of railroad rails. Clinkers smaller than 6 inches fall through the grating onto a pan conveyor, while the larger pieces are discharged on the ground and broken up by a small crawler tractor after it has cooled. Such breaking up is done only when necessary, since the majority of clinker is normally less in size than the 6-inch. spacing of the grates.

The pan conveyor deposits the still-hot clinker onto a woven wire belt conveyor about 100-feet long which in turn deposits the hot clinker into an open bottom auger conveyor. The first half of this 400-ft. auger conveyor is reversible to maintain the pile height at the beginning of the discharge.

(*Continued on page* 110)

The woven wire belt conveyor, over 100 feet long, delivers hot clinker to the clinker storage pile.

48,000% Service Life Improvement!

Colmonoy Spray Gun Tip Really Lasts

Gun tip used in liquid glaze spraying application lasts 480 times as long when made of Colmonoy alloy

Rapid wear in spray gun tips used by Clayburn-Harbison Ltd. of Abbotsford, B. C., to apply liquid glaze in production of glass-lined sewer pipe presented a serious problem in operating costs. The unique tip reclamation solution worked out by a maintenance engineer at the company utilizes Colmony* No. 6 nickel base hard-surfacing alloy as a base metal. The rebuilt tips have achieved a 48,000% improvement in service life as compared with original tips made of low carbon steel, carburized.

Clayburn-Harbison produces glass-lined sewer pipe in 4, 6, 8, 10, 12 and 15-in. diameters (Figure 1). As pipe diameter increases, air pressure used in the glaze spraying operation must be increased. This in turn produces a greater erosive effect on the spray tip.

After ten minutes of typical operation with one of the original tips, wear is generally great enough to begin to distort the spray, making it difficult to achieve a uniform glaze. After less than an hour, the tip is normally worn completely through at the point where the air picks up the liquid glass solution (Figure 2).

Tip Cost Very High

New tips had cost $4.75 each. With two shifts operating, this meant that it was costing more than $75.00 per gun per day for tips alone. Clayburn-Harbison was not long in initiating an investigation to uncover a cost-cutting solution.

Although Colmonoy No. 6 is merchandised specifically as a hard-surfacing alloy, its recognized erosion resistance properties were enough to warrant an investigation of the possibilities of using it as a base metal. In the method finally developed, a new front tip portion is produced by welding Colmonoy No. 6 rod onto the remaining threaded protion of a burned-out tip (Figure 2). The resulting spray gun tip lasts six weeks, or 480 times as long as the original low carbon steel carburized tip. The Colmonoy tip is produced at a total cost of $7.50. Comparing cost-life ratios shows a net saving of more than 99% in tip operating costs with the rebuilt tips.

*Registered Trade Mark.

Reclamation Procedure

Major interest in the spray tip application centers around two factors: (1) the unusual use of a hard-surfacing material as a base metal and (2) the fact that the critical surface of the spray tip is on the inside where a bronze air-vane is inserted, making it a difficult application.

The threaded hexagonal section of a worn tip forms the reclamation base. Standard $\frac{5}{8}$-in. diameter carbon rod is used to produce a mold on which to rebuild the tip. The rod is machined to be 0.002-in. greater than the inside diameter of the threaded portion.

A tool bit ground to the exact inside contour required is applied to the lathe-mounted carbon rod. This finishes the mold shape at one end of the carbon rod in about five minutes. The threaded tip portion is then slipped far enough onto the rod to produce the desired overall tip length.

Colmonoy No. 6 rod is then applied. A Victor O oxy-acetylene torch tip is used with the softest neutral flame possible. The soft neutral flame is especially important at the start of rebuilding when the Colmonoy material is being welded onto the carburized low carbon steel. Build-up, working out from the original section, is accomplished very gradually and usually requires about $1\frac{1}{2}$ to $1\frac{3}{4}$ hours (Figure 3).

Ability to develop a build-up of this nature is dependent in part on a unique property of Colmonoy No. 6, i.e., its broad plastic range. As long as the alloy is held between 1900° F and 2050° F, it will remain plastic. In this state, it can be formed and wiped and worked in a manner not possible with competitive alloys having narrow plastic ranges. The broad plastic range as much as anything else about the alloy makes possible spray tip reclamation by this method.

After the rebuilt tip has cooled, the carbon mold is drilled out. A new mold must be made for each tip rebuilding operation because the Colmonoy rod, as deposited, tightly hugs the carbon mold, insuring an absolute duplication of mold contour inside the tip.

Hand Finished

The rebuilt tip is next screwed onto a threaded piece of $\frac{5}{8}$-in. diameter cold rolled rod. The tip thus mounted is put in a lathe and hand finished. A simple dressing tool is produced from a piece of broken grinding wheel shaped to fit the lathe tool holder. The tip facing operation (Figure 4) is the most important. Shape and finish of the tip face must meet stringent specifications to produce an even spray for glazing.

The tip is then unscrewed from the threaded rod and repositioned in the lathe to permit dressing the inside. Another piece of grinding wheel, long enough and small enough to fit inside the tip, is used. This hand dressing operation is not as critical; removal of carbon particles is all that is necessary. Proper control of the shrinkage factor during the welding phase of tip rebuilding makes it possible to hand dress the Colmonoy tip inside and out in about 45 minutes.

In addition to the spray tip application described, Clayburn-Harbison also has used Colmonoy No. 6 rod successfully to reclaim brick dies, sewer pipe die liners and extrusion dies of various types, all with gratifying results.

Fig. 1 (above). Spraying liquid glaze onto ID of sewer pipe at Clayburn-Harbison Ltd., Abbotsford, B.C.

Fig. 2 (above). Worn (left) and rebuilt (right) glass spray tips. Note that face end of worn tip appears undamaged; tip tends to wear through some distance back from the face end at the point where the air picks up the liquid glass solution. The rebuilt tip is produced by welding Colmonoy No. 6 onto a salvagable hexagonal section from an original tip of low carbon steel, carburized. The hex portion has threads on I.D.

Fig. 3 (below). Rebuilding glass spray tip with Colmonoy No. 6 rod.

Fig. 4 (below). Facing rebuilt tip is critical operation; shape and finish must be just right to produce even spray during glazing.

Lift Trucks Run This Brick Plant

Interstate Brick Uses Fleet of 17 Trucks in All Phases of Operation

Brick are set from the machine onto pallets for lift truck handling into dryer. Each pallet holds 243 brick. Follow picture sequence clockwise around both pages.

Interstate Brick Co. operates a fleet of 17 lift trucks in their extensive works at Salt Lake City.

Nine model Hyster 20 and eight model Hyster 40 lift trucks are used in all phases of the operation from hauling the wet bricks away from the extrusion and cut-off line to the loading out on trucks for delivery.

A unique feature of this operation is the type of pallet used. It is single faced and is made of three sections, each measuring 8¾" long x 35" wide. The three together form a pallet 26¼" x 35". The photograph above serves to illustrate this feature. It will be noted that the pallet section is the same length as the brick. There are two advantages in the use of this type of pallet (1) it is small, lightweight, easily stacked and handled at the production line; and (2) the stackers do not have to step up on or stretch across a large pallet when placing brick on the far edge. The men can complete the stack on each section before placing the next section on the floor.

The next step in the operation is the drying of the brick—either in heated tunnels or by air in the yard. Entrances to the 14 drying tunnels are at the other side of the room from the production line. One lift truck operating at a comfortable pace hauls the pallet load from the line into the tunnels. These tunnels are about 75 or 80 feet in length and accommodate 60 pallet loads.

The bricks remain on the pallets during the two day drying cycle. This is possible because of low heat in the drying tunnel. After drying, the loads are removed and placed in storage until need for kiln setting. A lift truck again is used for this job and a total of 18,000 bricks can be removed and stored per hour.

Sometimes the bricks are taken to the yard and allowed to air dry prior to kiln setting rather than be placed in drying tunnels. In this case two lift trucks are used to haul the pallet loads from the conveyor line.

Loads of brick are hauled to delivery trucks by lift truck. The lift truck in right background places pallets of fired brick in storage.

Loaded pallets of fired brick are stacked by lift truck in yard. These brick are ready for shipment.

After the brick have been in the quick dry tunnels for proper time, doors are swung up, held by retainers, and loads are removed by lift truck. One truck can remove and haul to storage the 60 loads from each tunnel in one hour.

Part of room where loads are stored after quick dry and until needed for kiln loading. Lift truck heads into aisle to set load of 300 brick in storage. Lift trucks perform great variety of tasks in this plant.

This manufacturer uses several types of kilns, the Smith kiln, field kiln, tunnel kiln, and bee hive kiln. In kiln setting the lift trucks bring pallet loads of brick from the storage rooms to the crew which usually consist of two men. Each crew sets 18,900 bricks per day, except in the case of field kilns where three men set 50,000 bricks per day.

When the kilns have cooled down an unloading crew place the fired bricks on pallets and the lift trucks haul them off to the storage yard. The 40's are used in the storage yards and for all work in the field kilns. The 20's are used in the plants and for taking loads to and removing loads from the beehive kilns, Smith kilns, and tunnel kilns. On each truck the company has built a device for retaining the loads so that the bricks do not jolt off during some of the long hauls. Hauls as long as several hundred yards are common in a plant of this size.

Above, highly maneuverable lift truck places load in Smith kiln.

Crew with lift truck strips field kiln after brick have been fired. Job takes 12 days. Note integral part played by lift trucks in this operation.

Below, inside beehive kiln lift truck places load convenient to setting crew. Note attachment designed by Interstate Brick Co. to prevent brick slipping off pallet.

Firing Heavy Clay Products-Part IV

Static Pressures In Down-Draft Kilns

This is the fourth part of a series of articles on firing heavy clay products by Seanor. The first three parts appeared in Brick & Clay Record in June, 1959, page 99; July, 1959, page 46; and Sept., 1959, page 76. These articles will run in consecutive issues until completed.

By J. GEORGE SEANOR

Figure SP-3 (page 87) illustrates a down draft kiln. The setting and the floor are not shown. In effect there are three "stacks" involved in the circulatory power of a kiln. If the kiln has "mechanical draft" there are two stacks and a fan. Two of these stacks are internal and these two stacks have had little discussion in kiln literature. The three stacks have been designated in Fig. SP-3 as Leg 1, Leg 2, and Leg 3, the latter being the familiar kiln stack.

Columns of Hot Gases

These three legs consist of columns of hot gases when a kiln is under fire. Each of these three columns have "static pressure" features, just as does the external and visible stack. Leg. 3, or the stack has been discussed in some detail in preceeding articles. The effects of Leg. 1 and Leg. 2 can be determined by the same formula that is used for determining the static pressure potential of a stack. Leg 1 and Leg 3 provide favorable pressure heads. Leg 2 provides an unfavorable static pressure or head. The true circulatory power, or draft, or pressure-drop, or whatever you may call it, is the net results of the interplay, or combined effect of these three legs. Many of the traditions of kiln firing is due to the fact that Legs 1 and 2 are not properly designed and proportioned.

Leg 1 extends upward from the top of the fire bed if the kiln is coal fired; or from the point of combustion if gaseous or liquid fuel is used. The top of Leg 1 is the highest point under the crown of the kiln. Leg 1 is, in effect, a curved stack like "D" in Fig SP-1. Its potential static pressure is proportional to its height and the potential static pressure can be calculated from the draft formula.

Leg 1 is a stack which is open to the atmosphere at the bottom and which is closed at the top. The static pressure of Leg 1, when transformed into velocity pressure is favorable as is the stack.

Leg 2 is also a column of hot gases and is closed at the top and open at the bottom. It extends from the highest point under the crown through the ware, through the floor openings, to the top of the waste gas flue leading to the stack. More strictly it extends to the lowest point in the top of the flue leading to the stack. It's length can be changed by damper manipulation in the flue. It's height is less when the damper is raised and is greater when the damper is lowered.

The static effect of Leg 2 can be calculated from the stack formula. The potential static pressure of Leg 2 is un-favorable. To arrive at the net static pressure of the kiln as a whole the draft of Leg 2 must be subtracted from that of Leg. 1 plus that of the stack.

Static Pressure

Notice that in Fig. SP-3, the top of the fire bed is below the top of the flue leading to the stack. Let us assume that this kiln is at sea level and that the barometer is 30.00″ and the temperature of the atmosphere (air surrounding the kiln) is at 60° F. Assume that the height of Leg 1 is 22′, the height of Leg 2 is 20′ and the height of the stack, or Leg 3 is 30′.

Suppose that the average temperatures of the three legs, when the kiln is first lighted, are as follows: Leg 1, 900° F; Leg 2, 300° F, and Leg 3, 150° F.

Then the theoretical or potential static pressure of the three components would be:

Leg 1	0.20″	of draft	—favorable
Leg 3	0.066″	"	—favorable
Total	0.266″	"	total favorable
Minus Leg 2	0.092″	"	—Unfavorable
	0.174″	"	net potential

static pressure of the kiln under these temperature and atmospheric conditions. Since, while the kiln is underfire, the gases are moving through the kiln these static pressures would not be found because much of the static pressure is translated into velocity pressure causing the movement of the bases.

Gas Volume

The volume of kiln gases that Leg 1 would moved up into the kiln would depend upon the open cross sectional area through which it can exert its pressure. The volume of gases that can be moved down through Leg. 2 would be limited by the open area—the interstices between the bricks in the setting, and the total cross sectional area of the floor openings. Note that when you subtract the un-favorable effect of Leg 2 of 0.092″ WP from the favorable effect of Leg 1, of 0.20″ WP, the net pressure, favorable, of these two legs is 0.108″ of water pressure, or draft or whatever you may call it.

At this time gases would move up into the kiln and down through the setting and floor openings and into the waste gas flue, without any help from the stack, which has hardly warmed up by this time. If the cross sectional areas involved were sufficiently large enough this kiln would neither need to be aided by a hot-stack, a booster-fan, a watersmoking

fan, nor a high draft fan. When the fire bed, or point of combustion is below the top of the flue leading to the stack circulation will start through the kiln the instant the fire is lighted. The volume of circulating gases will depend upon the cross sectional areas involved.

Leg 1, which is a curved stack, if of sufficient height, can be very effective in causing air which surrounds the kiln to flow up through the firebed, in the form of primary and secondary air. It is also effective in causing the resulting kiln gases to rush up into the space under the crown, and then slowly down through the interstices between the brick, and through the floor openings.

Pumping Combustion Gases

The ease with which combustion gases from the burner are pumped up into the space under the crown is dependent upon the open area between the bag wall and kiln wall, and how tightly the brick are set in kiln. If the area behind the bag wall, and if the setting is too close to the bag wall and extends too far up to the crown above the bag wall the natural effect of Leg 1 is greatly diminished. If the kiln is coal fired Leg 1 helps to draw air up through the firebed.

Let us suppose that on the kiln shown in Fig. SP-3 the top of the fire bed is 4′ below the grade level, or below the level of the floor. Traditionally the top of the firebed is about 3½′ above the grade level on coal fired kilns. If the top of the fire bed were 3½′ above the grade, instead of 4′ below the grade, then Leg 1 would be 7½′ less in height, or 14½ ft. high. Then if Leg 1 has a height of 14½′ and its average temperature is still 900° F, its potential static pressure would be 0.132″ WP, Then:

Leg 1	0.132″	of draft	—favorable
Leg 3	0.066″	"	—favorable
Total	0.198″	"	total favorable
Minus Leg 2	0.092″	"	—Unfavorable
	0.106″	"	net potential

static pressure at this stage of the burn when the point of combustion is 3½′ above the floor of the kiln.

Then the following comparison can be made:

If height of Leg 1 is 22′ potential static pressure is .....0.174″

If height of Leg 1 is 14½′ potential static pressure is .....0.106″

Difference is 0.068″

Therefore, if the point of combustion is 4′ below the grade level instead of 3½′ above, or when the height of Leg. 1 is 22′ instead of 14½′ the net circulatory power of Leg. 1 is about 64% greater.

It has been said that lowering the firebox on a down draft kiln is as effective as increasing the height of the stack by 10′. Actually 10′ of extra stack height would do little good at low temperatures when you need greatest volume of circulation.

Cross Sectional Area

The space or cross sectional area, through which Leg. 1 can pump kiln gases up under the crown is important. One plant superintendent provides his setters with a stick or gage, that is 5′ long. He does not permit any bricks being set without 5′ clearance between setting and crown. By this artifice he eliminated about 11,000 second and third grade brick per burn, which formerly troubled him.

High Bag Wall

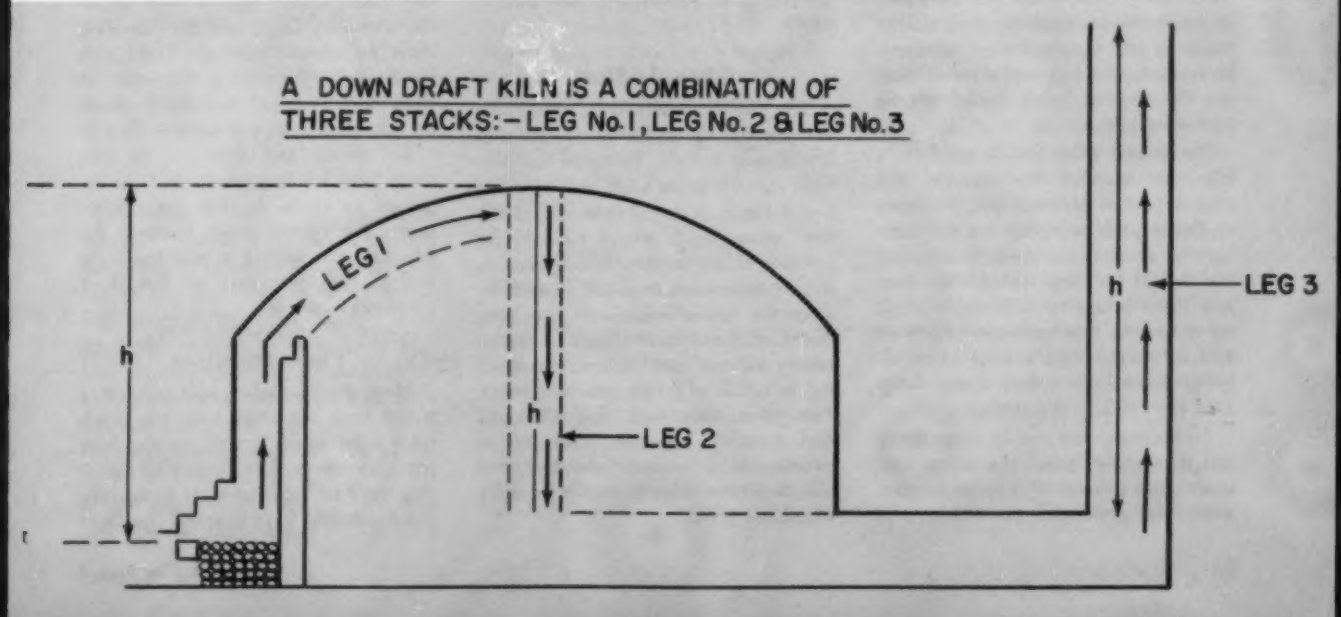
Notice that a rather high bag wall is shown in the kiln in Figure SP-3. When a high, artificial, bag wall is used and if the setting is also battered back in front of the bagwall, to provide a large unrestricted throat so that fire box gases can rise up quickly and easily into the space under the crown, they will mix with the cooler gases already under the crown, and be tempered in so doing.

Therefore, at the beginning of the burn, you can start off with a higher furnace temperature and brighter fire than you can if there is no artificial bag wall and if the brick approach the crown adjacent to the bag wall, too closely.

Many kiln operators do not realize it, but they do have a bag wall in their kilns even if they leave out the artificial bagwall. Then the brick in the setting form a bag wall, and if the artificial bag wall is absent, they must start off with a slow gentle fire in the furnace. Otherwise, they will slab the adjacent brick in the setting by too rapid application of heat.

There are some who advocate elimination of artificial bag walls. At some time, or another, they have re-

Fig. SP-3 (See Text)



moved the artificial bag wall and found better results. When the artificial bag wall is removed the brick in the setting form a bag wall, but further back. This increases the cross-sectional area of Leg 1. It is better all around practice to use an artificial bag wall set further out into the kiln floor space. Then you can start off with a bright fire and hotter furnace temperature, because the hot gases which rush up into the space under the crown are tempered (cooled) there by mixing with the cooler gases already under the crown, before they touch any of the brick in the setting.

Some kiln operators actually believe that if you use natural gas you do not need as much cross-sectional area enclosed by the bag wall. They explain this by quoting the supposedly logical, but inapplicable, conclusion that natural gas burns quicker than coal and therefore does not need as much space.

Many Brick Twisted

The writer recently visited a plant firing with gas who had fallen for this really illogical conclusion. By very careful firing procedure they were able to prevent rolling serious enough to drop brick into the bags, but many of the brick in the fired kiln were twisted from incipient tendency to roll. Due to the bottle neck formed by the too small area behind the bag wall they generated a hot, cutting, flame right in the furnace in which most of the possible secondary combustion was completed. This overly hot spot, within the bag wall, caused the brick set adjacently to shrink prematurely and all the brick in the setting leaned outwardly towards the bag walls accounting for the twisted brick found in the furnished kiln.

No matter what fuel is used on a kiln, or whether the burners are pressurized or atmospheric, the cross sectional path provided for the mixture of combustion gases and excess air should be large enough to permit these gases to roll easily right up under the kiln crown, where they will be mixed with cooler gases already there before they move down onto the brick in the setting.

In building new, or in remodeling old, down draft kilns, the writer estimated the volume of kiln gases that would be generated per minute, at time of greatest fuel consumption and volume, and then provided enough cross sectional area for Leg 1, so that the gases could move into the space under the crown at a velocity of not over 15 to 17 miles per hour.

Bag walls in periodic kilns play an important part in proper firing of clay products.

On the kiln depicted in Fig SP-3 in which Leg 1 has a height of 22′ the theoretical static pressure at 900° is 0.20″ W. P. If the throat or outlet between kiln wall and bag wall is restricted because the bag wall is too close to the kiln wall, or if the upper throat between the crown and the top of the setting is too greatly restricted because the setting is too close to the crown, much of the 0.20″ of static pressure potential is used up by resistance through these restrictions. Such bottle necks should not be tolerated, and the cost of eliminating them is very little (really not a cost at all but a profit).

Tradition Is Obstacle

The biggest obstacle to overcome in eliminating these bottlenecks is traditional beliefs. In order to provide enough cross sectional area for Leg 1 (both at the bottom and at the top) some brick would have to be left out of the setting, which according to erroneous tradition would reduce the fuel-efficiency of the kiln. Many of the older traditionalists sincerely believe that unless you stuff the kiln full of brick you will sacrifice what they call fuel-efficiency and monthly capacity. Actually an overloaded kiln sacrifices fuel and also turns out a lower yearly capacity of salable brick.

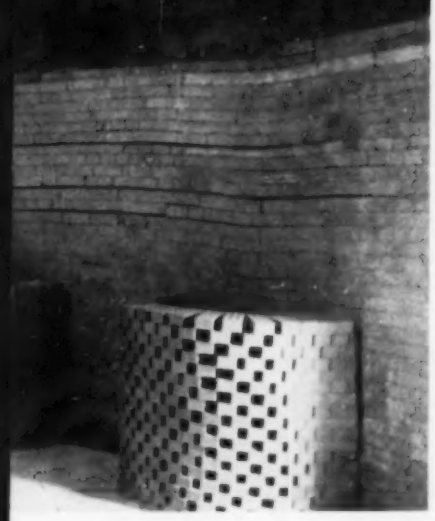
It has been shown that Leg 1, (Fig SP-3) when properly engineered, is a very potent factor in the circulation of gases through the kiln. When properly detailed, the effect of Leg 1 is especially beneficial at the beginning of the firing period, at which time it is desirable to circulate a great volume of air heated by a small volume of combustion gas. The effect of Leg 1 diminishes as high-fire is approached and this fact will be discussed later.

Leg 2, Fig. SP-3 is a counter-force opposing the combined favorable forces of Leg 1 and Leg 3. It's potential static pressure must be subtracted from the potential static pressures of Leg 1 plus Leg 3. Leg. 2 is a hot vertical column. It requires work to move hot gases downward, or to overcome the buoyancy of a hot vertical column. In Leg 2, the hot gases which are formed under the crown by Leg 1 and the furnaces, must be moved downward through the brick in the setting, through the floor openings, and into the horizontal flue leading to the stack or Leg 3.

In an up and down draft kiln there is much less pressure drop required to move the hot gases from under the crown down through the brick, if the setting is not too tight and if the total area of the floor openings is ample.

Floor Openings

Many traditionalists still argue that if the floor openings have too much total open area, it will let the heat out. However, that is exactly what you want to do. You want to remove the gases that have reached the floor



and which have given off their BTU and oxygen to the brick as it has moved down through them. You want to get the old gas out and get new, hot gas, which is rich in oxygen to replace it.

When the total area of the floor openings and the total cross sectional of the under-floor flues is too small, the resistance through them is too high. It requires too much pressure-drop to move the required (or desired) volume of gases through this bottle-neck. The traditional stingy sizing of the floor openings and the under floor flues is God's gift to the salesmen of high draft fans, and stack booster fans. They cash in on this outmoded tradition, or else it takes 10 or 12 days to fire a kiln which could easily be fired in 4 to 5 days. The traditions in regard to the percentage area of floor openings and percentage area of flues originated when it was economically possible to fire kilns in from 8 to 14 days but this is today economically impossible.

Below Top of Flue

The writer wishes to emphasize that the kiln in Fig. SP-3, because the point of combustion is below the top of the flue leading to the stack, will have a pressure on the floor from the moment it is lighted. This is a requirement for the most efficient and uniform transfer of heat from gases to solids and to insure uniformity of temperature across the kiln—in all sections of the kiln; and for proper annealing of the finished brick while they are cooling. This point is well recognized by designers of industrial furnaces other than ceramic furnaces.*

Ideal For Conditions

The kiln, Fig. SP-3 is ideal for the required conditions when the kiln is first lighted, and when it is desired to circulate large percentages of air, mixed and heated mildly by small percentages of combustion gas. It is also ideal for applying the mixture to all brick in the kiln, rather than to short circuit it through the kiln by high draft fans.

The potential static pressure conditions of Legs 1, 2 and 3, change as the burning progresses. The best oxidizing temperature, for carbon, is generally considered to be around 1500° F. The following represents these characteristics of the 3 legs about as they would be found at best oxidizing temperatures. Leg. 1, height 22 feet, temperature 2000° F. Leg 2, height 20 feet, and temperature 1500° F, Leg 3, height 30 feet and temperature 1000° F.

As the temperature rises in a kiln the theoretical static pressures of Leg 1, and Leg 2, approach each other, but there is still more pressure in Leg 1 than in Leg 2, to keep the gases in the kiln under pressure to the floor.

At the above temperature the following conditions would exist (as to theoretical static pressure)

Leg 1—0.253″ favorable
Leg 2—0.216″ unfavorable
Leg 3—0.28 ″ favorable

and the net pressure would be .253 plus .28 minus .216, or 0.317″ potential static pressure, favorable, in the kiln system. Note that at this higher temperature, or when oxidizing at 1500° F, Leg 1 has lost some of its lead over Leg 2, but the stack, having been heated up, has jumped from a pressure of 0.066″ at the beginning of the burn to 0.28″ when watersmoking.

1000° in Stack?

Some kiln operators might think that it is impossible to get a temperature of 1000° F in a kiln stack. If there are no bottle-necks in the kiln system, and if the flues are large enough, a stack having sufficient cross sectional area will do it and more. If there are no bottlenecks in the kiln anywhere, including the stack, the stack must be dampered at oxidizing time in order to maintain temperature. Otherwise too much overdraft is taken into the kiln.

The best method of dampering is to admit cold air into the stack through a port in the side of the stack. At one plant, when the base of the stack was red-hot, and being dampered by admission of cold air, the firemen used to astonish their friends by throwing their straw hats into the stack through the cold air port. The straw hats, without being damaged in any way, would be thrown out of the top of the stack almost instantaneously.

Bottled-heat in the firebox is the cause of much clinkering of coal. It is the reason why tuyeres or retorts burn out quickly on coal stokers, and the reason pressure gas burners or oil burners burn up too often. Pressure burners costing from $125 up should be protected from the ravages of cutting, bottled flame by locating them low enough relative to the flue to the stack, so that they can never be under bottled heat.

Lower Fireboxes

A study of, and a comprehension of, the effect of the three Legs 1, 2 and 3, will enable a kiln operator to understand why the engineers suggested lowering the fireboxes on the kiln they studied. (1) Lowering the fireboxes properly would also lower the pressure line to the floor as suggested.[1]

Some kiln operators, and some kiln engineers, try to lower the pressure line to the floor by using pressure burners. They can do so, after a fashion, but in so doing they run into difficulties from short flame, excessive hot spots near the burners, and pressure variations within the kiln that are too great from section to section.

Natural static pressure is the best way as it gives more uniform firing through the kiln than does pressure derived from velocity pressure from pressurized burners. Unfortunately

(*Continued on page* 111)

*"The Making, Shaping, and Treating of Steel," Sixth Edition, Published by the United States Steel Company, Pittsburgh 1951, P 196.

[1]Sherman, Lunger & Rice, "The Significance of Draft in Down Draft Coal Fired Kilns. Journal of The American Ceramic Society, Volume 7, 1924.

Cope With Problems of Depletion Allowances

By Douglas Whitlock
SCPI Board

Douglas Whitlock

I think next year one of the most important things that this industry faces is how to cope with the problems of depletion allowance on clay products.

In order that we may understand the present status of depletion, I think I'd better review for you exactly where we stand today, and to explain the problems presented by our present posture. As you know, we had depletion allowance on two bases, 5% on brick and tile clay; brick and tile clay being, of course, clay used to make brick and tile because there is no such technical thing as "brick and tile clay", and we also had 15% on fire clay used to make brick and tile.

Test Case

In order to establish our position, which differed from the Treasury Department, we had to go to court, and we very carefully prepared and directed a series to test cases on brick and tile clay. We won in all the lower courts. We won in all the courts of appeal. And we won the Merry Brothers-Cherokee Cases in the Supreme Court by its refusal to review the lower court decisions, thus making value of the end product the basis of computing our depletion allowance.

In approaching the problem of 15% on fire clay, we also had test cases, but over which we did not have as much control as in brick and tile. It happened to be that the most important test case came in the sewer pipe industry, with whom we were cooperating, but over which we did not have as much control.

The test case, Cannelton Sewer Pipe, was won in the lower courts and in the court of appeals, but finally the Supreme Court decided that 15% on the end product was not the law. So, now we have two conflicting legal decisions; one is that the 5% depletion allowance is based on the value of the end product on brick and tile clay (and even in that case there was some fire clay involved). In the Cannelton Case involving fire clay and sewer pipe, it was decided that only the value of raw clay was the basis of the depletion allowance.

Value of Product

Both decisions turned on the value of the first commercially marketable product. These decisions have left us with a completely confused situation. The Treasury Department being violently opposed to all depletion has taken the position that the Cannelton Case overruled the Merry Brothers Case and that therefore all depletion, whether at 15% or 5%, is based on raw clay rather than the first marketable product. Now, we disagree with that. We hold that the Cannelton Case did not overrule the Merry Brothers Case, and we have said this to the Treasury Department. The Treasury Department says that isn't right. However, they have not as yet issued a firm or definite regulation on this point—we are still in negotiation with them. Any decision arrived at by the Treasury will effect all open tax years of all companies in this industry. We have asked that before any final decision is made, we have an opportunity to discuss this with the Treasury Department.

Probably the only recourse we have to a solution of this question is further court cases. In other words, when a treasury agent or a government official says that you have to base your depletion on raw clay, the only answer we can give him is "No, we're going to base it on the first commercially marketable product under the Merry Brothers decision." Then they'll say, "well, we're going to insist", and then we're going to say, "well you'll have to go to court to prove your position", and then we'll have another court case, and it may have to go clear to the Supreme Court to establish the proper principle.

1960 Returns

Therefore, for all of you who are asking what do we do for our 1960 returns, or what position do we take with Treasury Officials who come in and want to make some settlement or solution, I can only say, file your returns as you have in the past, insist that the law is according to the Merry Brothers Case and not according to the Cannelton Case. Out of the 189 pending cases which are now in the courts throughout the land, some decisions will begin to come in giving us guidance in order to give this industry better direction on sustaining our position. In other words, what I am telling you is that our position is no different than it has been all along—the Merry Brothers Case is still the law—the Cannelton Case differs with it, and we can only find out from further court cases what is going to happen retroactively so far as brick and tile manufacturers are concerned.

Now, to add to this confusion, we have the legislative side of the pic-

(Continued on page 92)

From an address at the SCPI 1960 annual convention, Nov. 14-16.

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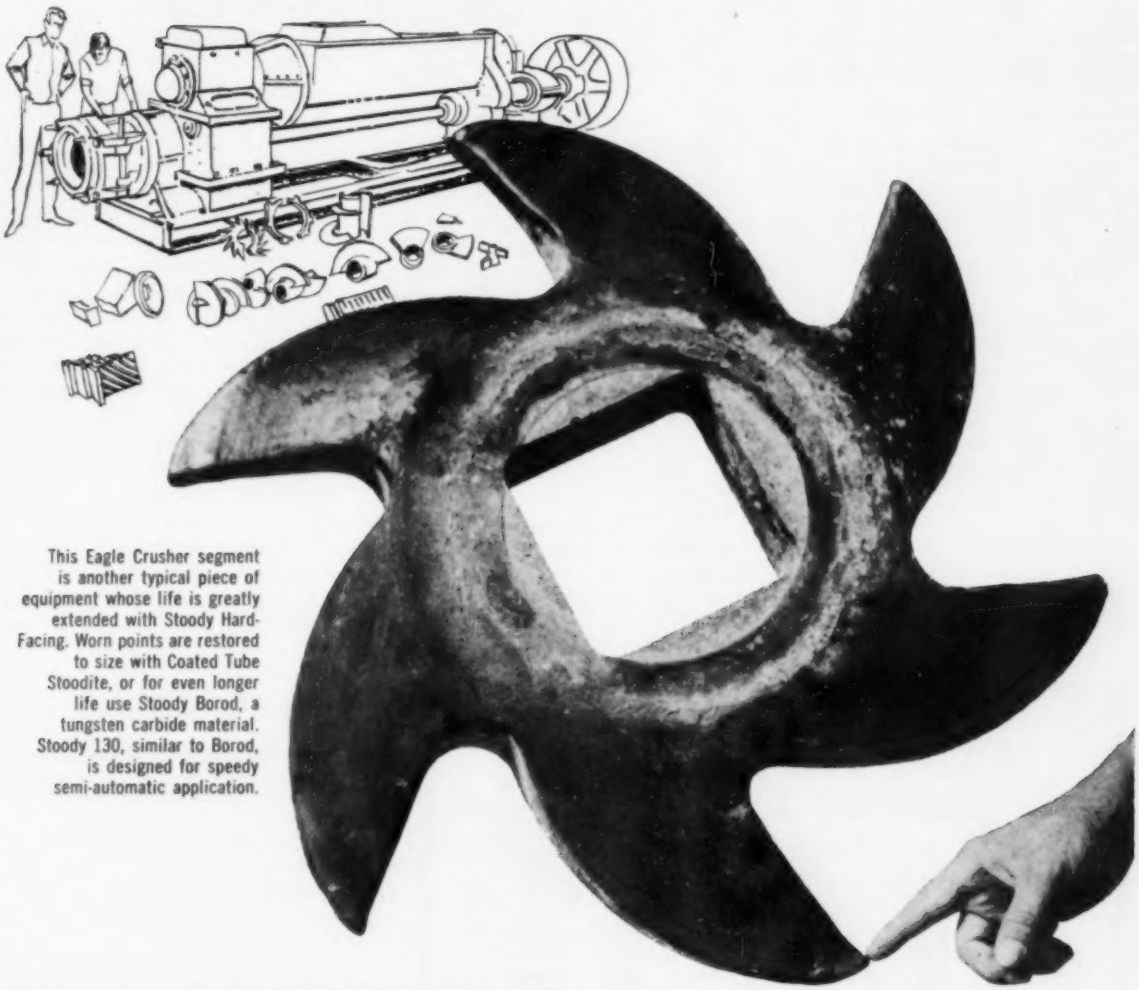

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(*Continued from page* 90)

ture which is further complicating the entire picture. In the closing days of last June when Congress was ready to go home and the fiscal year was just ending and the excise tax bill was before Congress, a group of Senators who have not liked depletion because they come from consumer states, seized the opportunity to establish a beach-head against depletion by picking on brick and tile clay, and passed what is known as the Gore Amendment. This Gore Amendment says that the percentage depletion on clay for depletion purposes shall be the value at the pug mill.

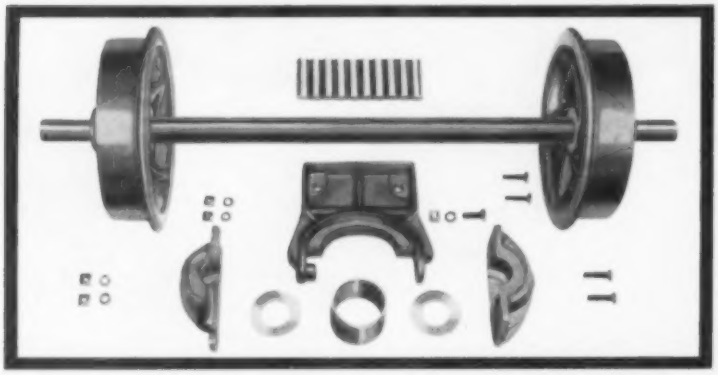
This law does not become effective until January 1, 1961. But it confuses the court situation because it indicates a Congressional intent to limit our value of depletion to ground clay just before it enters the pug mill and therefore we have a situation where legislative action may color judicial decision. A big attempt is being made by the Government through the Department of Justice and the Treasury, to modify the Merry Brothers Case in the 189 cases I referred to by saying the Congressional intent was clearly shown by the Gore Amendment.

Gore Amendment

Now to further complicate the situation, the application of the Gore Amendment says that all depletion on clay used for brick and tile (and they throw fire clay into this category) shall be 5% and shall be based on the market value of ground clay in the area. Now there is no value of ground clay before the pug mill, and how we're going to establish a value or what formula the Treasury Department is going to use, remains completely unexplored and we have no guide posts. So, we're going to have a problem of dealing with the Treasury Department on how to establish the value of ground clay at the pug mill on which to give the 5% depletion allowanced under the Gore Amendment.

We're going to have to have negotiations to determine the value. Whether each company is on its own to make the best judgment for the Treasury Department from the books of the company, or whether there is some area way of arriving at a value in the interests of the clay industry, is a matter of exploration and negotiation which only the Depletion Committee of SCPI can adequately handle in the interests of the entire industry.

And then besides the application of the Gore Amendment, we've added further complications. The cement industry in order to adjust their depletion problems, which were less complicated than ours, accepted a proposal from the Treasury Department that the Gore Amendment be made retroactive if a taxpayer elected to use it and so in the closing hours of the last session after the Gore Amendment had been passed, the Treasury and the cement industry agreed on making the Gore Amendment retroactive back to 1951. The Depletion Committee gave long thought to the same offer made to us, as to whether or not the Gore Amendment giving us 5% of ground clay at the pug mill, should be applied to the brick and tile industry,



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especially since we had the Merry Brothers Case in our favor and further when there seemed to be no way of establishing the value at this point, because the value of ground clay at the pug mill was quite different than calcium carbonates or limestone at the kiln feed, which is the point at which the cement industry determines the value for its depletion. We turned down this offer of making the Gore Amendment retroactive on brick and tile, although, the door has been left open by the Treasury if we want to come in the next session and ask for it.

The Depletion Committee reported to the Board of Directors the other day, and the Board of Directors sustained the Depletion Committee position that we should not ask for legislation making the Gore Amendment retroactive.

We then come to the next problem in depletion. There are many members of Congress who believe that the Gore Amendment and the treatment of the brick and tile industry by the Treasury Department has been inequitable and unjust and should be remedied. There are many members of Congress who are asking us what is the remedy. We now face the problem of deciding on the amendment of the Gore Amendment. Proposals have been made that we accept the point of valuation, which is ground clay before the pug mill, and that we try to increase the rate of depletion from 5 to 15%. Other proposals have been made that we insist upon the same treatment that the cement industry got and establish the value of the clay just before the kiln feed (a term we haven't used, but which would be the same thing as in cement).

Rate Increase

Others say that perhaps all we can get is the rate increased from 5 to 15% which is equal to what cement enjoys on limestone and calcium carbonate. What we can do toward amending the Gore Amendment is something we can't decide now, because there are other people besides us involved. We have many friends in Congress who are looking to us for guidance on this. Men who want to help us. We also have men in Congress who want to defeat us. Some are on the Ways and Means Committee, including its Chairman. We have Government Officials in the Treasury Department who also dislike depletion and want it defeated. So, all the Depletion Committee can do (and all this industry can do) is to let the Depletion Committee continue to negotiate and guide our procedures recognizing the hurdles and obstacles that are going to be thrown in our way by the Treasury Department and certain members of Congress who do not like depletion.

So, summarizing, retroactively, we still have the Merry Brothers Case unreversed. We have the Cannelton Case establishing a value on raw clay as the basis of depletion valuation. We have many negotiations going on by members of the industry with the Treasury Department, whose agents have yet to receive guidance from Washington on what to do, and yet are trying to drive the value back to raw clay. The only way we'll ever hold our position is to fight this through the courts. We are planning to refuse to accept retroactive application to the Gore Amendment. We are going to try to negotiate

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with the Treasury on some sort of a workable, equitable basis of applying the Gore Amendment to the future depletion that we get in 1961. At the same time, we're going to try to amend the Gore Amendment and get more equitable treatment for the brick and tile industry.

Strong Support

Now, all this means a great responsibility on the members of the industry. It means a very important consideration and judgment to be made by the members of the Depletion Committee, all of whom are able and have lived with depletion from the beginning. It means above all of that, that when decisions are made by the Depletion Committee, they must have the strong support of every manufacturer of brick and tile. This means that the manufacturers have got to immediately establish closer relationships with their Congressional Representatives and Senators. This industry is notorious for its disregard of their legislative representatives in Washington.

In answer to the recent questionnaires we received from the members of this industry asking about the present status to one question, "have you seen your Congressman and what does he say about depletion", one manufacturer wrote back and said, "would you mind supplying me his name". We have got to change our habits in this industry—get away from our kilns and look around and see who represents us in Congress and talk to him about the inequities that have been heaped upon this industry by an unfriendly Treasury Department and an unfriendly Congress. We have got to secure the sympathetic understanding of the members of Congress to our problem. We have a legitimate cause.

As long as other minerals are getting depletion, we're entitled to depletion. We've got to tell our story to the members of Congress on how it effects us individually. That means that this industry has got to gird itself for the battle ahead in Congress regardless of what comes out of the court cases.

During the next few months, SCPI is going to devote itself to getting the individual manufacturer into the proper relationship with the members of Congress. Giving you information to tell the members of Congress about the inequities as well as the proposals that the Depletion Committee is advocating to correct these inequitable situations. It's hard to get messages across in this industry. You have got to take the responsibility of keeping closely in touch with this matter so that you know exactly what is being proposed.

Responsibility

You've got to make depletion, or a letter about depletion, or a memorandum about depletion, or a questionnaire about depletion, A-1 plus in importance in your company operation. You've got to feel the responsibility and take the responsibility of knowing your Congressman and Senator and talking to them, taking the leadership in getting all of the representatives or Senators from your state together to discuss depletion. Come to Washington and call them together or talk to them at home about your problem. If they're antagonistic, sell them on our position—if they're friendly—secure their help in changing the situation.

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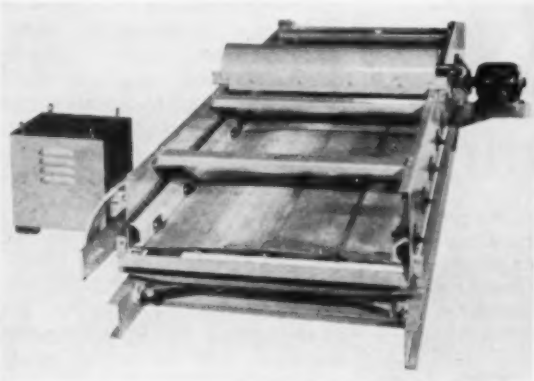

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SPEED HANDLING . . . REDUCE DELIVERY COSTS . . . UNLOAD WITHOUT MOVING TRUCK . . .

with a fully-hydraulic

TEALE-200 CRANE!

AND YOU DON'T SACRIFICE TRUCK HAULING CAPACITY!

TEALE-200 WEIGHS LESS . . . USES LESS BED SPACE . . . BUT, DOES A BETTER JOB!

Constructed of newest alloy steels . . . T-1 and COR-TEN . . . wherever desirable, to reduce weight and bulk while retaining rugged strength . . . the new "200" weighs only 2400 lbs. (with 16-foot boom), to 2500 lbs. (with 28-foot hydraulically telescoping boom) . . . fits in just 14-17-inches of space. Yet it lifts from 3,750 lbs. (at 8') to 2500 lbs. (at 16') . . . and a remarkable 1250 lbs. (with hydraulic boom 28' out)! Hydraulic outriggers stabilize load throughout movement! WITHOUT MOVING TRUCK . . . from a single position, you can place a full cube of bricks anywhere in a 360° circle . . . from truck side, to 16' out . . . from high scaffolds, to 33' below ground. One man operates with complete efficiency . . . and complete safety, even on sloping ground!

The TEALE-200 is equipped with 2-way controls. EXCLUSIVE, new solenoid-valve controls . . . with electrically activated manual-type valves . . . permit (1) straight remote solenoid operation, or (2) HAND CONTROL, with "feathering"! (It's the only Solenoid System that allows emergency hand operation.) "200" fits any truck with curb weight of 5,500 lbs. and up . . . is ideal for those with single axles!

FOR TOP CRANE POWER . . . plus FULL TRUCK PAYLOAD . . . TEALE-200!

For FREE literature and prices, CONTACT—

Teale
AND COMPANY
P. O. Box 605, Omaha, Nebr.

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ROBBY SAYS:

Look to
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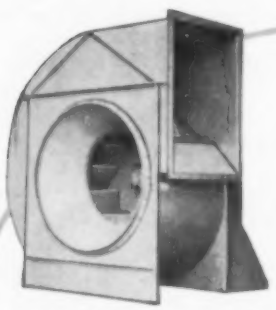
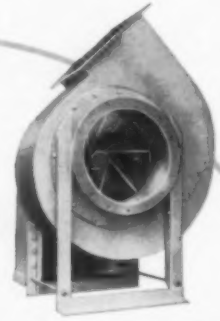
for
Smooth Handling
of Air

IN KILNS—DRYERS—SINTERING BELTS

Robinson air handling equipment for the ceramic industry is custom-engineered to meet the specific requirements designed into your tunnel kilns, periodic kilns, sintering belts, or product dryers. Long experience in improving air handling techniques gives Robinson engineers quick understanding of your problem, plus the know-how for solving it. Every Robinson solution has 3 ingredients: (1) efficient air handling, (2) low power consumption, and (3) extended mechanical life.



Type J Fan
600 to 450,000 cfm
Bulletin 2500



Type AE Exhauster
400 to 90,000 cfm
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Type CS
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Why not take a tip from Robby—look to Robinson for smooth handling of air—the result of expert engineering cooperation. Write today.

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ROBINSON VENTILATING CO.
119 HENDERSON STREET, ZELIENOPLE, PA.

Circle Service No. 63

Basic Refractories . . .

(*Continued from page* 71)

have proven most economical for the crucible of the lead blast furnace and the lower sidewalls of softening furnaces.

Another important use of basic refractories is in lining the burning zones of rotary cement kilns. For this application magnesite-chrome refractories set with steel plates have done an outstanding job. For kilns operating at higher temperatures spinel bonded magnesite refractories have satisfied the requirements.

The glass industry finds extensive use for basic regenerator checkers and regenerator sidewalls and crown. Fired forsterite brick are used most successfully in checker construction. However, with increasing regenerator temperatures, these requirements are being satisfied with fired spinel bonded magnesite or magnesite refractories. The regenerator sidewalls arches find best results in construction with forsterite or chemically bonded metal-encased magnesite-chrome brick.

These are but a few of the many applications of basic refractories which came into use in the late 1800's. Its start was established in the steel industry from which it has expanded to all industries requiring its high refractoriness or resistance chemically to the conditions subjected.

Special Refractories . . .

(*Continued from page* 77)

tions having special needs such as for high-heat conductivity, load-carrying ability etc.

Current applications run the gamut of kilns, furnaces and processing equipment. Shape design and methods of use vary widely because each job is custom engineered to insure maximum return on the investment.

Typical examples of installations by industry are:

Ceramic. Tunnel and batch-type kilns, fired directly and indirectly. Furniture for kiln-car super-structures that support green ware during firing. Porcelain-enameling and frit furnaces. Ball mills. Glass tanks and annealing lehrs.

Ferrous Metallurgy. Heat treatment furnaces, ranging from small

annealing units to huge reheat furnaces. Soaking pits. Recuperators. Melting furnaces, fuel fired and electrically heated. Sinter furnaces. Furnaces producing rare, high-purity metals.

Nonferrous Metallurgy. Furnaces melting aluminum, brass, bronze, copper and magnesium. Aluminum and magnesium cells. Zinc ore reduction and refining furnaces. Scrap recovery furnaces.

Power. Packaged steam generators. Stoker- and pulverized-coal-fired furnaces. Ash pits.

Gas. Generators. Reforming and fixing units.

Process. Mannheim and multiple-hearth furnaces. Vertical retorts and reactors. Hydrogen reformers. Pebble heaters. Hydrogen-chlorine and sulfur burners. Catalytic crackers. Carbon black furnaces.

Miscellaneous. Missiles. Nuclear reactors. Lime and cement kilns. Incinerators. Pyrometric equipment.

A unique use for some of these products cuts across industry and takes advantage of their wear-resisting qualities in combatting abrasion by impingement of fine solids as well as by dry or wet solids flowing across a surface. Involved here are dust collectors, coke chutes, flues and other lines, gas scrubbers, hydroclones, hoppers, feeder tables and mills.

Plastics and Castables . . .

(*Continued from page* 76)

thermal conductivities of products like Hydrecon refractory castables reduce heat loss and air passage through walls. Therefore more advantages are gained in combustion since it takes less time and fuel to bring furnaces to operating temperatures and maintain them due also in part to the monolithic, joint-free nature of these refractory materials. The history of the growth of specialty refractories is thus seen to be one of the basic fundamentals of economics—the law of supply and demand. The need is there and refractory manufacturers during the past decade have been striving diligently to satisfy the needs or demands.

Castables, plastics and ramming mixes should have physical properties approaching those of refractory brick. Such properties too should be carefully surveyed by the consumer. The consumer too must realize that a complete analysis of the situation should be made before the selection of a specialty refractory is made. It is not enough to purchase a "specialty" because of the company's salesman or chemical composition alone, or even a certain type of binder or clay. Each installation is different—from the standpoint of fuels, combustion conditions, abuse of the refractories, temperatures, etc. The selection of a specialty refractory should be based upon an analysis of complete furnace conditions and an analysis of the type of performance a specific type of specialty product will give under the existing conditions.

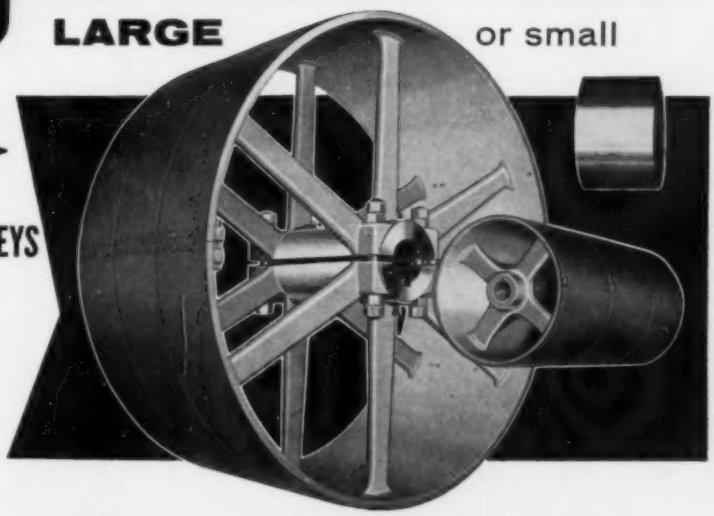
The physical properties approaching brick that specialties should have are:

1. Dimensional stability at all temperatures. 2. Good strength at all temperatures. 34. Good resistance to spalling. 4. Sufficient refractoriness for a particular application.

Refractory castables are supplied in dry, bagged form and generally

PULLEYS THAT PERFORM ON THE JOB...

LARGE or small



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MICROMETAL CAST-IRON PULLEYS

There is no substitute for experience in producing cast-iron pulleys for use in our many modern industries. Today, after 88 years of experience, the Ehrsam Company is still continuing research to produce quality cast-iron pulleys.

Whether you use small pulleys or large pulleys, totally split pulleys, corrosive surface or wearing surface, you can be sure of quality gray cast-iron plus service when you specify Ehrsam Micrometal pulleys.

In quality cast-iron pulleys, experience counts and this is what Ehrsam is noted for. Call the J. B. Ehrsam and Sons Manufacturing Company and discuss your needs for standard or special pulleys.

THE J. B. EHRSAM & SONS MFG. CO.

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SALES REPRESENTATIVES: THOMER EQUIPMENT CO. • MINNEAPOLIS, MINNESOTA

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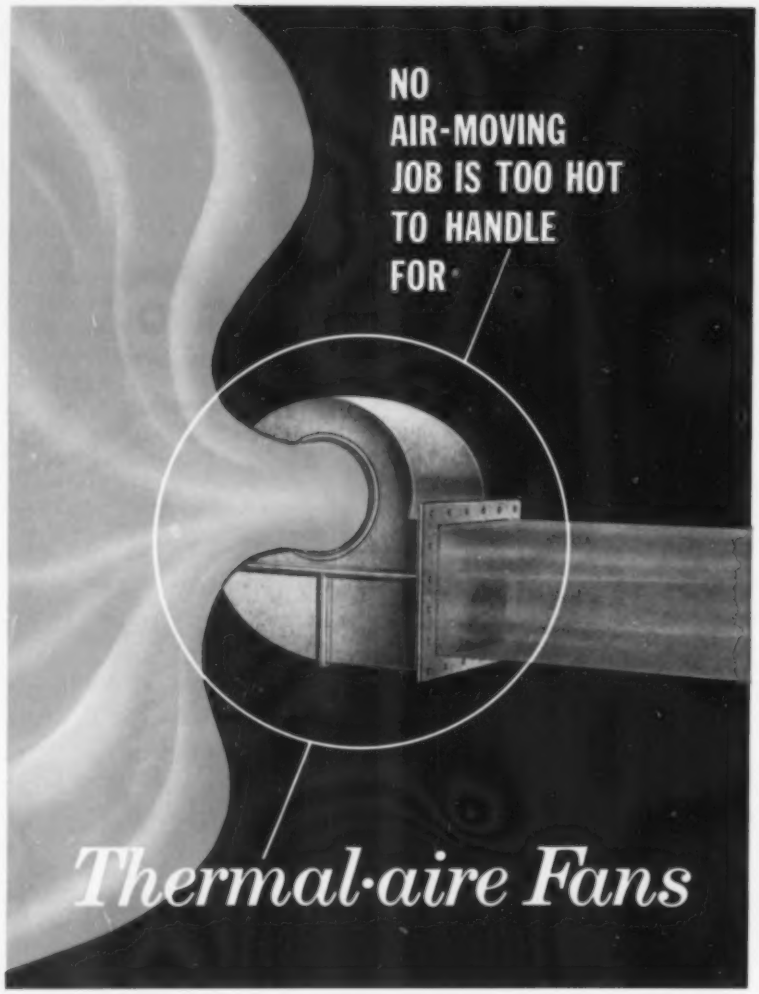
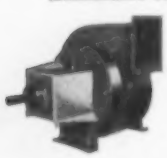


Does your operation involve temperatures up to 2000°F.? Do you use ovens, furnaces, kilns, dryers . . . circulate or exhaust air, fumes, dust or gases? If so, chances are Thermal-Aire Fans are working for you. Why do leading manufacturers of air-moving equipment specify and install Thermal-Aire Fans for high-temperature, air-moving applications?

QUALITY OF ENGINEERING: All Thermal-Aire Fans are engineered to meet precise specifications for standards of performance, and carry the Certified Ratings Seal of the Air Moving and Conditioning Association (AMCA).

QUALITY OF CONSTRUCTION: All Thermal-Aire components are constructed of prime, heavy gauge materials developed especially for high-temperature application – and field-proved by many years of on-the-job service.

CONTINUING RESEARCH: Specialists in air moving devices since 1879, Garden City maintains a modern, fully equipped laboratory for continuous product development and improvement. Example? Garden City's exclusive Air-Cooled Shaft. Keeps bearings cool. Eliminates circulatory systems. Prolongs fan life.



Write for Bulletin 960
Garden City Fan & Blower Co.,
807 Eighth St., Niles, Michigan.

Circle Service No. 66

are a mixture of calcined material, some type of cement and additional ingredients. They are mixed with water to a consistency like regular concrete and are then poured into place in a manner approximating the pouring of ordinary concrete.

Low Duty Only?

Recently while reading a volume on refractories published in 1950, one of the authors came across the interpretation that refractory castables would render service, g e n e r a l l y, where a low duty firebrick would be used. This statement could not in any way be applied to the refractory castable of today. The dictates of today's markets are such that genuine progress has been made in the refractory castable field—and it would be well to remember the pitfalls a buyer can run into when he assumes that all refractory castables can be used anywhere.

Our Company takes pride in the fact that the J. H. France Refractories Co. marketed the first successful refractory castable in the United States. Today, our line comprises refractory castables having recommended operating temperature ranges from 1800° F to 3500° F and specifically includes products for use at 1800°F, 2000°F, 2400°F, 2750°F, 3000°F, 3200°F and 3500°F.

It can be easily seen, therefore, that refractory castables today can be used where low duty, high duty, super duty and even higher classification refractory brick are often applicable. With advances as rapid as they have been, low grade castables using firebrick bats are rapidly being supplanted by materials having higher refractory values. Higher purity materials, higher grade clays and other ingredients have all tended to enhance refractory castables being manufactured in refractory plants at this time.

Plastic refractories are packaged wet in a moldable consistency. They are normally extruded in a column which is automatically sliced and packaged in cardboard containers and also in steel drums. This type of product requires no additional working prior to use.

In the December issue of Brick & Clay Record it was erroneously reported that the Structural Clay Products Institute will hold its 1961 convention at White Sulphur Springs, W. Va. The 1961 convention will be held at the Shoreham Hotel, Washington, D. C.

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Brick & Clay Record

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3	15	27	39	51	63	75	87	99	111	123	135	147	159	171	183
4	16	28	40	52	64	76	88	100	112	124	136	148	160	172	184
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6	18	30	42	54	66	78	90	102	114	126	138	150	162	174	
7	19	31	43	55	67	79	91	103	115	127	139	151	163	175	
8	20	32	44	56	68	80	92	104	116	128	140	152	164	176	
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8	20	32	44	56	68	80	92	104	116	128	140	152	164	176	
9	21	33	45	57	69	81	93	105	117	129	141	153	165	177	
10	22	34	46	58	70	82	94	106	118	130	142	154	166	178	
11	23	35	47	59	71	83	95	107	119	131	143	155	167	179	
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Use this valuable service to obtain complete information about the many products available to you. Send us one card now and save the second card for later use.

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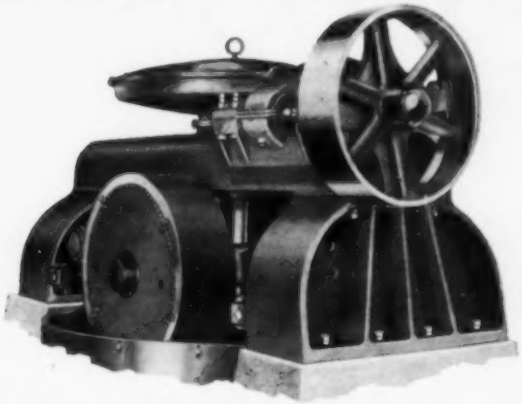
Chicago 3, Illinois

CLEARFIELD

MULLER TYPE MIXERS AND GRINDERS



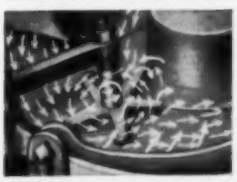
For low-cost GRINDING:

The Clearfield Maximuller, with its low maintenance and power consumption, is unequalled on the basis of cost per ton of product ground. This heavy duty dry pan is available in 9 and 10-ft. diameters and incorporates all the features essential to efficient, economical grinding. Operating on the revolving pan principle, it has ample-size screen plates in the pan bottom for better control of fineness of grind and rate of discharge. Large, heavy mullers are placed far apart to obtain the greatest possible crushing effect.

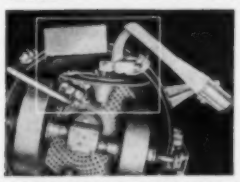
For better-balanced MIXING, BLENDING:

There is a complete line of Clearfield Mixers to handle batches of from ½ to 40 cubic feet. Here are a few of the features that make Clearfield Mixers the most efficient way to mix, blend and temper pre-ground raw materials . . . whether they are dry, semi-dry or with relatively high liquid content:

REVOLVING BOTTOM keeps every particle in the batch in continuous motion. Ingredients are alternately spread and gathered together to maintain highest mixing efficiency. Since the *pan* revolves instead of the mullers and scrapers there is no "lag" in the flow of material.



STAR-SHAPED AGITATOR covers the entire flat surface of the revolving bottom and prevents material from forming hard cakes or lumps. The agitator is driven by contact with the revolving bottom or the material being mixed. This creates an intense "whirlpool" action . . . speeds up the mixing process, promotes clean emptying of the pan.



DOUBLE DUTY DISC cuts all the material free from the revolving pan rim at each revolution, turns it over and diverts a continuous roll of material under the mullers. When moved to the discharge position it unloads the complete batch within 15 to 20 seconds! Saves time . . . and insures a uniform product throughout the batch.

FOR DETAILED INFORMATION, SEND FOR OUR FREE LITERATURE.

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CLEARFIELD, PENNSYLVANIA, U.S.A.

Pacific Coast Representative:
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CAROLINA KYANITE
Gives Better Control Over Fired Ceramic Bodies

Vastly improved pressing properties let you press faster without laminations, when a specific grain size of Carolina Kyanite is added to the mix—even in a dry operation.

Both low heat (as low as Cone 5) and high heat strength are greatly improved—with a notable reduction in warping, dunting and shrinkage.

Lower uniform thermal expansion permits faster cooling with greater freedom from crazing and cracking.

These are some of the properties, more important than ever, by which Carolina Mullite and Kyanite are helping to control quality of product and to lower costs in the ceramic field.

It is our pleasure to be of technical assistance and we will gladly furnish samples for your application. For prompt action, please call on our New York office.

Grain Sizes 35, 48, 100, 200, 325 mesh

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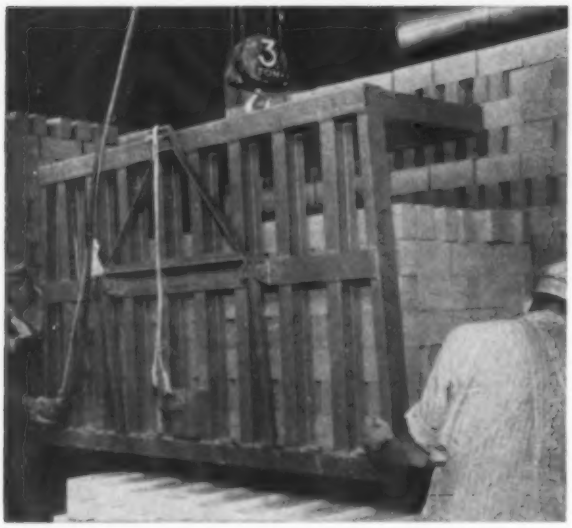
Make Brick Handling Easy...

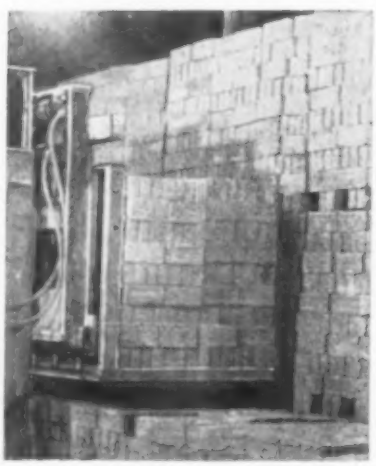


PRIESTER Brick Forks

- Save Time
- Save Money
- Save Labor

Also Priester truck cranes for unloading from delivery trucks. Write for bulletin.

Brick in units of any size are handled by Priester Brick Forks. Automatic operation simplifies and speeds brick handling setting and drawing kilns, loading and unloading trucks and box cars.



Forks with flap grippers for cored and solid brick. Give service . . . take the hard work out of brick handling. Write today for more information.

BRADNEY MACHINE CO., INC.

Middletown, New York

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Play Safe with

GLOBE

SUPERIOR
LADLE
BRICK

wire cut
and dry pressed

PRODUCING
ONLY ONE
PRODUCT

Guarantees to our customers Safe,
Efficient and Low Cost Ladle Practice
Always Dependable
Globe Superior Ladle Bricks are
used everywhere for all types of
Iron and Steel ladles

SERVING THE STEEL INDUSTRY SINCE 1873

THE
GLOBE

BRICK COMPANY

East Liverpool, Ohio

Circle Service No. 70

Fireclay . . .

(*Continued from page 69*)

operation for very large or intricate clay shapes. This method calls for heavy reinforced steel molds into which a damp mix is fed in relatively small quantities and rammed by molders using pneumatic hammers.

Drying and Burning

The brick formed by any of the processes mentioned above are dried either on hot floors or in tunnel or humidity dryers, and fired in periodic down draft kilns, or in continuous car-type tunnel kilns. The temperature of firing depends upon the maturing temperature of the clays, and upon the service for which the brick are intended.

The properties of the finished product are depended upon the character and the amounts of the different clays in the mix, the finest of the grind, the relative proportions of particles of different sizes, the process of manufacturing, moisture content during forming, the forming pressure and the firing temperature.

Chemical analyses and test for refractoriness and other physical properties render possible the selection of the most suitable clays for each specific purpose. By controlled variations in the details of manufacturing, brick are produced, having the physical properties required for any particular service. Constant laboratory control of all steps in the process of manufacture contributes to uniformity of chemical and physical properties, and workmanship in size of the finished product.

The outstanding properties of super-duty fireclay brick are high refractoriness, aluminum content of 40 to 44%, strength and constancy of volume at high temperatures, low porosity, high resistance to fluxing, and remarkable resistance to thermal spalling.

In the application of super-duty fireclay brick, it is important that standard sizes which can be made by the power press method of manufacture be used to the greatest possible extent. Large or intricate shapes must necessarily be made by hand or by the air ramming method. While super-duty shapes so made have the same refractoriness as those manufactured by the power press process, they do not possess some of the other desirable physical properties to the fullest degree.

Before the introduction of super-duty fireclay brick, those now classified as high duty brick had to meet all the demands of industry for fire clay refractories for service under severe operating conditions. This, they did with marked success. As furnace conditions in many industries became increasingly severe, a field developed which could be served adequately only by products of higher refractoriness. In their own field, however, high duty fireclay brick still are used most economically, and they will continue to be used to the amount of millions annually.

Even within the temperature range for which intermediate and low duty brick are amply refractory, the use of high duty brick is often an economy, since temperature of furnace operation is not the only factor which affects the life of the refractories. High duty brick are more resistant to spalling influences than are fire-

JIFFY-LIFT CAN TRIPLE YOUR DELIVERIES DURING PEAK PERIODS!

Users all over the country report that Jiffy-Lifts earn their own way—and then some.

Jiffy-Lift's efficient engineering and ease of operation insure years of economical, trouble-free service, and make the loading and unloading job as rapid and as easy as possible. You can actually cut your delivery time to one-third over outdated methods. Easily installed and maintained, the Jiffy-Lift is your answer to loading and unloading problems.

- Four Wheel Drive . . . reduces slippage, safer to load and unload on an incline, fast, smooth operation.
- Automatic Trip Release . . . raises cradle while driver readies next cube, automatically stops.
- Four Cable Suspension . . . eliminates swinging, permits lifting 10,000 pound loads with ease.
- Dual Controls . . . may be operated from either side of truck.

JIFFY LIFT

For Complete Information, Write, Wire, or Phone today!

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Circle Service No. 71

MECO

cutting wires

your kind of integrity

MECO clay cutting wires earn extra profits for the progressive plants that use them—beyond their inherent high quality. If any one fact stands out in MECO's fifty-years of serving you, it is this: you can depend on MECO service to keep your plant producing profitably. EXAMPLES: Rush orders are shipped to you the same day—we meet airplanes on a few hours' notice to cut unprofitable down-time. Prior to the 1959 steel strike we laid in a special wire supply to last you through March 1960.

And the reason the wires themselves are dependable is that we control the quality—absolute uniformity at reasonable price is achieved on precision automatic machines—the range of gages, sizes and twist styles is the broadest available anywhere. If dependability has an effect on your products, ask The Manufacturers Equipment Company, 218 Madeira Ave., Dayton 4, Ohio. Please request Bulletin CW-1.

MECO

ENGINEERED CLAYWORKING AND HANDLING EQUIPMENT

Circle Service No. 72

clay products of lower refractoriness; and unlike intermediate or low duty brick they may be burned hard enough to render them very resistant to disintegration by carbon monoxide gas. When costs of transportation and of handling and of laying are considered, it is evident that structures built of high duty brick cost little more than those built of less refractory materials.

In certain portions of many industrial furnaces, the refractory structure is subject to temperatures which are relatively moderate or low. For such conditions, brick of the intermediate or even the low duty class may give excellent service. The low temperature range, these brick are sometimes stronger and more resistant to abrasion than high duty brick.

Intermediate and low duty brick in general are dense, mechanically strong, tough and resistant to abrasion and to slag action at moderate temperatures. For service in which there are rapidly fluctuating temperatures, power press brick are to be preferred to those made by the extrusion process. Intermediate and low duty brick show little permanent change in volume when heated with the temperature ranges for which they are suited.

Insulating Refractories . . .

(*Continued from page* 73)

of insulating fire brick offers the advantages of reduced fuel consumption, shortened firing cycles, reduced heat input per cycle, improved product quality, lower construction costs and ease of waterproofing. Weatherproofing materials will perform satisfactorily in the temperature area made possible through use of insulating fire brick.

Furnace output is also increased because a wall constructed of insulating fire brick ususally requires less than one-half the thickness of a dense fire clay wall. For a 36′ diameter kiln an additional 14% increase in floor area is available and therefore added kiln capacity and output is obtained when comparing a 10″ wall of insulation to a 25″ wall of dense fire clay construction.

The *heat treating industry* has made good use of Insulating Fire Brick. In addition to reducing heat loss through furnace walls and roofs, a much more rapid heating and cooling cycle can be employed because

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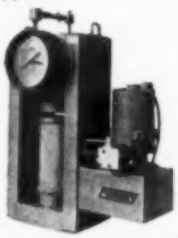

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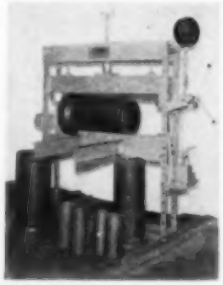

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Circle Service No. 73

these lightweight insulating fire brick store little heat. Faster production results particularly with batch type furnaces because there are no long waits while the furnace heats up or cools off. Increased production can also result from less scrap loss by more accurate temperature control. Reduced heat flow through walls means more even temperatures in all parts of the furnace interior with no temperature fluctuations during heat treating.

The growing use of special furnace atmosphere requires brick linings that can withstand disintegrating effects without rapid deterioration. The reducing atmosphere containing carbon monoxide requires special consideration. Insulating Fire Brick chemically inert to this reducing atmosphere are available and therefore these ever-increasing number of controlled atmosphere applications can also have the advantages of insulating fire brick.

Thinner walls and lighter weight construction are possible with insulating fire brick. A 4½" thick wall of these brick will provide as much insulation as 13½" to 18" of heavy duty fire brick. This lighter construction saves space, an important consideration in crowded work areas. Thin lightweight walls also reduce over-all weight, save money by allowing use of a lighter structural steel and lighter foundations and footings. Brick laying time is reduced and costs are lowered with light, easy-to-handle insulating fire brick.

Insulating Fire Brick offers many advantages when used in *glass* furnaces. In its search to eliminate heat waste (as much as 80 to 90% in the average glass melting furnace) the glass industry is finding wider application for insulating fire brick. Leading glass manufacturers have achieved appreciable improvement in heat utilization with some new insulating practices.

Glass Furnace Sidewalls

One of the newest is insulation of *glass melting furnace sidewalls.* This is being done with considerable success, particularly on furnaces melting the dark colored amber and green glasses. By preventing rapid heat loss, insulating fire brick applied to exterior walls raise the temperature of the glass batch. This has resulted in more rapid melting into the batch of "stones" and of batch that becomes stagnated in low temperature viscous glass. Sidewall insulating also has resulted in decreased wear on sidewall blocks and at the vertical joints. This has been due to decreased convection currents in the furnace that normally wash away the protective layer that forms on the refractory inner walls.

Calculations indicate a reduction of fuel requirements of four to six per cent when sidewall brick are applied.

In order to properly condition glass for efficient operation of the forming machines, *forehearths* must be well insulated. Use of insulating fire brick minimizes heat loss through forehearth walls and crown and allows more uniform heating of the glass as it passes through.

Use of insulating fire brick as insulation for *regenerator walls and arches* is standard practice in most plants. These are a few of the important applications for insulating fire brick but there are, of course, many others.

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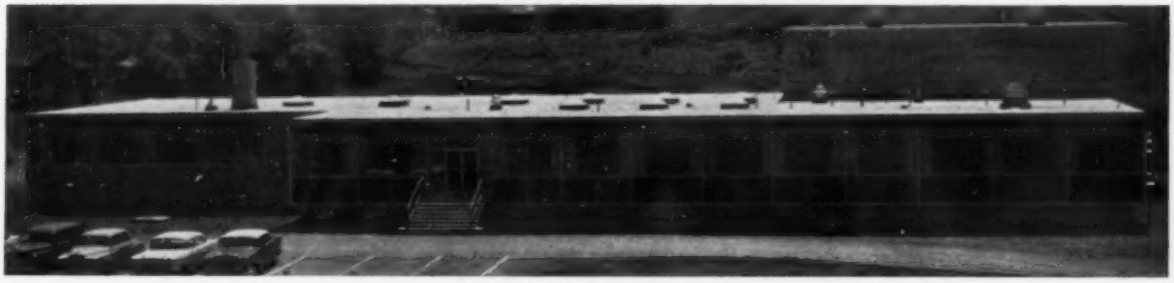

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PAGES
22 &
23

Circle Service No. 76

Silica Refractories . . .

(*Continued from page* 71)

prevent contamination of the raw material

(c) Grinding and screening equipment for precise grain-sizing

(d) Automatic batching systems which minimize human error

(e) Forming equipment to insure maximum density and uniformity

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(g) Adequate testing and selection procedures to insure products of proved quality.

While quartz is the normal form of silica found in nature, it is by no means the only form. Silica is a most complicated mineral with regard to its many crystalline forms. There are three principal forms of silica with which we are concerned, namely:

	Specific Gravity
Quartz	2.65
Tridymite	2.26
Cristobalite	2.32

The idea in burning silica brick is to obtain as high a degree of conversion of quartz to cristobalite and tridymite as possible. The reason for this is to avoid high permanent expansion in service due to converting the remaining quartz in the brick to cristobalite and tridymite. By burning the brick to approximately 2680° F., this conversion is fairly complete.

Use of Silica Brick

As is true with any engineering material, the uses to which the material may be put and its subsequent behavior are largely dependent on the properties of the material.

Probably the most outstanding characteristic of silica brick is their ability to withstand high loads without subsidence or failure up to very nearly their melting point. It is this property which makes them so valuable as open hearth roof brick and crown brick in glass tanks. For example, pure silica melts at about 3110° F., yet open hearths are often operated at roof temperatures of around 3060° F. In laboratory tests using a 50 psi. load, super duty silica brick will often reach a temperature

(*Continued on page* 108)

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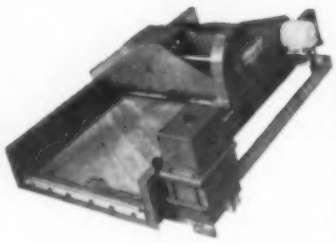

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in the neighborhood of 3090° F. before failure. This load bearing ability allows use of sprung arch construction with wide spans.

Another characteristic of silica brick, which accounts for its success as a steel plant refractory, is its ability to tolerate high amounts of iron oxide without lowering its refractoriness appreciably. The reason for this lies in the fact that two immiscible liquids are formed between silica and FeO. This high tolerance for iron oxide is very important in the open hearth, since otherwise the brick would be rapidly slagged away.

Likewise, the high tolerance of silica for lime is also an important property, since in service lime is often taken on as an impurity. Here the high tolerance for lime is related to the same mechanism as was mentioned for FeO—that is, immiscibility.

Acid Behavior

Silica brick are considered as an acid refractory, meaning that they are attacked readily by basic materials (such as magnesia, alkalies, etc.). Ordinarily, they must be kept separated from basic refractories used in the same furnace.

Silica brick, regardless of how hard they have been burned, will expand when heated. This expansion is of two types:

(1) Permanent reheat expansion, and

(2) Reversible thermal expansion.

The permanent expansion is due to the fact that there remains in the burned brick a certain portion of unconverted quartz. When subjected to heat subsequent to burning, this quartz will tend to convert to cristobalite and tridymite giving a resultant permanent expansion. Silica brick should be burned sufficiently hard so that only a small amount of permanent expansion is left in the brick, not over ¾% linear.

When any type of refractory brick are heated they expand, and when cooled they contract. If no changes of a permanent nature have occurred during the heating the brick return to their original dimensions. This effect, therefore, is known as reversible thermal expansion. Fire-clay brick have a fairly low and uniform rate of thermal expansion. The thermal expansion of silica brick, on the

other hand, is not uniform. By far the greater part of the expansion takes place below 600° F. The usual practice in laying silica brick is to allow from 5/32″ to 3/16″ per foot for expansion. This is about twice usual expansion allowance for fire-clay brick.

Spalling Characteristics

Silica brick are normally thought of as being highly susceptible to thermal spalling. The reason for the susceptibility to spalling is related to the thermal expansion of silica brick. However, most of the expansion takes place below 1000° F. Above this temperature the brick expands very little. Actually silica brick are most sensitive to spalling in service requiring intermittent heating from room temperature to the operating temperature. Where silica brick are kept above approximately 1200° F., they have excellent resistance to thermal spalling, because above this temperature range they show very little expansion. Thus, silica brick are highly desirable for uses where the temperature is kept high. An example of a use of this type is in the hot zones of tunnel kilns.

The cold strength of silica brick is not usually high. Normally a strength of 500-600 psi. modulus of rupture is considered adequate since this will allow the brick to be shipped without excessive damage. However, strengths higher than this are desirable because silica brick of higher strength are usually more resistant to thermal spalling.

The trend in the past has been to stress the need for chemical purity, but now since chemical purity has almost reached the ultimate, the tendency is to stress improvements in porosity and density.

Silica brick will often show a mottled appearance with dark spots against a background of either a cream or tan color. These are often referred to as liver spots.

The consensus is that mottling has no adverse effect on the quality of silica brick. This is emphasized by the fact that when silica brick are reheated under certain conditions, those which are mottled can be cleared up and given a uniform color, and those that are not mottled can be given a mottled appearance.

By nature the silica minerals are light in weight. The brick themselves are relatively light as compared with fire-clay brick—usually in the range of 6.2 to 6.6 lb. per 9″ equivalent. This means the freight per thousand brick is considerably less than most other refractory brick.

Applications of Silica Brick

Silica brick are generally thought of as being primarily a steel plant refractory. There are, however, a good number of applications in other industries where silica brick can be used to good advantage.

Listed below are a number of furnaces where silica brick are commonly used:

Coke ovens—by-product and beehive ovens; electric furnaces; heating furnaces—continuous type; basic open hearth-roofs; acid open hearth—above charging floor; soaking pits—upper walls; reverberatory furnaces for copper, nickel, brass and bronze; zinc distillation furnaces—center walls; zinc oxide furnaces; glass tanks—crown; ceramic kilns—crown in firing zone; vertical lime kilns.

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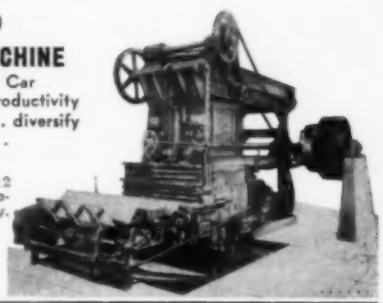

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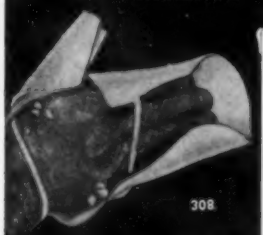

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Circle Service No. 83

Clay Aggregate . . .

(*Continued from page* 81)

As the clinker is deposited onto the clinker pile, it is then cooled by a water spray to cut down on the dust and absorption properties of the aggregate. A tunnel running underneath the clinker pile is used to reclaim the clinker. This tunnel contains a conveyor belt which delivers the clinker to a four-deck 4-ft. by 12-ft. screen where ¾-in, ⅜-in., ¼-in., and 3/16-in. sizes are separated, and conveyed to appropriate storage shipping bins.

Oversize from the screen is then sent through a hammermill-type pulverizer equipped with a 200-HP motor. The pulverizer is also equipped with 3/16-in. grates and the product from the machine is then sent directly to the 3/16-in. storage bins.

Another underground conveyor reclaims the sized aggregate and delivers the material to either one of two loading stations. Any blend of aggregate can be made utilizing this conveyor or straight sizes can be shipped.

Shipped by Rail

The bulk of the material is shipped by rail within a 200-mile radius of Jackson. The company also uses a sizable amount of the aggregate in its own concrete operations and for this purpose motor trucks can also be used. As a further aid to the consumer of Miss-Lite, moisture in shipments is closely controlled. This prevents loss of the dust, oft times desirable, during transit and improves the absorption properties of the aggregate during actual use. The 200-mile radius includes cities of New Orleans, Memphis, Birmingham and Monroe, La.

Officers of the company include W. H. "Brock" Day, president; Dale Cobb, vice-president; C. E. Sills, quality control manager, and Richard Messer, plant superintendent of the Miss-Lite plant.

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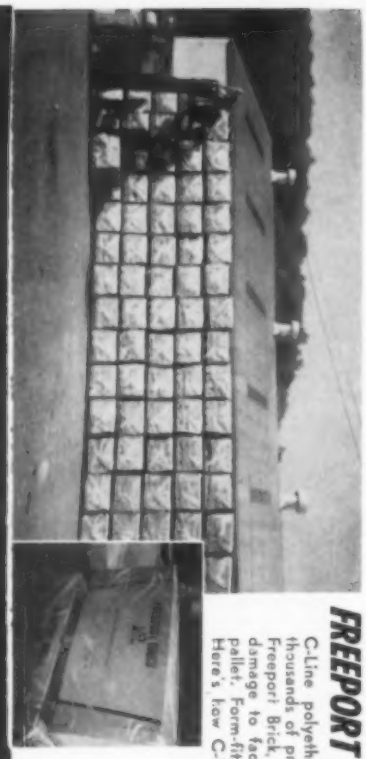

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Static Pressures . . .

(*Continued from page* 89)

when a kiln is pressurized by forced draft burners, the minute the power goes off, the pressure line in the kiln rises to its natural position, and the bricks below the natural pressure line are spoiled to a greater or lesser degree.

Many years ago, in an article in BRICK AND CLAY RECORD, the writer pointed out that the quality of the brick below the natural pressure line was poorer in quality than the brick above the natural pressure line. The most poorly fired brick in tunnel kilns generally are found below the pressure line of the kiln, or in those regions where the kiln gases waver back and forth from positive pressure to negative pressure. A few tunnel kilns have this condition. Traditionalists say that you cannot have positive pressure all through a tunnel kiln.

As an example of what happens when one fails to consider the volumes of gases encountered in kiln firing, the static and velocity pressures encountered, and the cross sectional areas of flues, floor openings, etc. the following case is described.

A few years ago a down-draft kiln brick plant was built. The three partners were (a) a brick plant millwright who had come into some money; (b) a coal mine operator; and (c) a preacher. They failed because they were never able to fire their kilns properly. The tops of the settings were overburned, and about 1/3 of the bottoms were underburns and resets.

Third Attempt

Several years later a third company attempted to start this plant again, but only lasted a few months. At that time this writer was in charge of a neighboring plant, and one night their day-shift burner stopped in at our plant to see how we did it. Our night-shift fireman showed him a kiln which had been on fire only a few hours on which there was 0.18″ of draft. He also showed him a kiln which was at high fire, and dampered back to around 0.12″ to 0.13″.

A short time later, after this third attempt failed, a carload of us drove up to see this plant. Upon entering the kiln yard, we raised the manhole cover exposing the flue in the stack. The flue had an effective cross sectional area of hardly one square foot and the stack was about 25′ away from the kiln's hub. Leg 1 was about 14′ in height—the fire boxes (coal) were well above the floor line. Leg 2 was about 26′ in height, the exhaust flue being about 6′ below the grade level. The stack was about 40′ in height. Fireboxes were too small, being very narrow and having a small grate area. The floor was tight—locally called a "solid bottom."

Sometime later this writer met one of the original partners, the millwright, who had designed the kilns. He had made the flue to the stack and the stack small in area so that they could not suck the heat out of the kiln and waste it. He had used very small bag walls so as not to use up valuable floor area. He had put the waste gas flue deep so that he could get a good lasting solid bottom over it. He had no conception of the volume of gas that must pass through a kiln, per minute, when it is fired in 3½ to 4 days. He still felt that the kilns were properly built but that there was something wrong with the clay down there.

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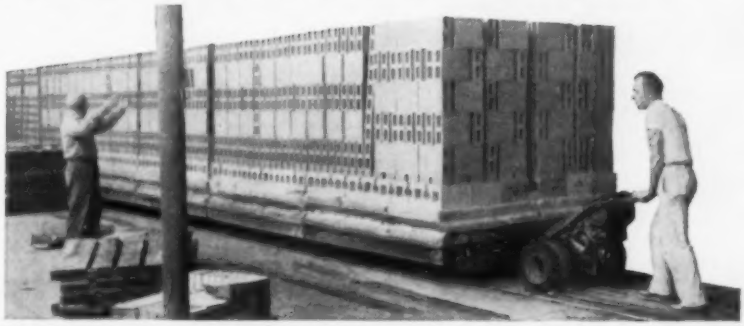

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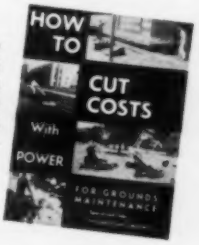

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FLORIDA Distributor of nation's top refractory manufacturer offers exceptional opportunity and working conditions for aggressive ambitious sales engineer. Must have minimum three years successful experience selling refractories to various industries. Forward resume to McDuffie, Industrial Equipment Company, Orlando, Florida. Prompt, confidential replies.

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PROGRESSIVE Midwestern face brick manufacturer needs experienced face brick superintendent for tunnel kiln operation. Address Box 1-BAF, care of BRICK & CLAY RECORD.

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POSITION WANTED

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WANTED—A copy of the September, 1949 issue of BRICK AND CLAY RECORD. Please advise us if you can supply a copy. Address your reply to Box 11-KHC, care of BRICK & CLAY RECORD.

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FOR SALE: 2 crawler shale planers. 6' & 9' Dry and 8' Wet Pans. 250 Dryer Cars 24" ga. Six Komarek Greaves Briquetting Presses. Intl. Vac-Air Steele 30, 40, 50 deaired Brick Machines. Boyd 4-mold and Gates 2 mold Dry Presses. Boyd Dry Press Installation. Ladd Cronin Circular 70' dia and four 125-150' long Tunnel Kilns. 4 x 6, 5 x 9, 5 x 17, 5 x 21", 8' x 36" Ball Mills. Williams 30 and 40 Hammermills. Mid-Continent Equipment Co., 8321 Gannon, St. Louis 32, Mo. Wydown 1-2826.

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2—8' x 56' rotary kilns, ½" welded shell.
2—Stearns-Roger 8' x 40' rotary dryers.
1—7'6" x 62' rotary kiln, ½" shell.
1—6' x 7' x 100' rotary kiln, 5/8" shell.
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2—4'9" x 32' rotary dryers, 5/8" shell.
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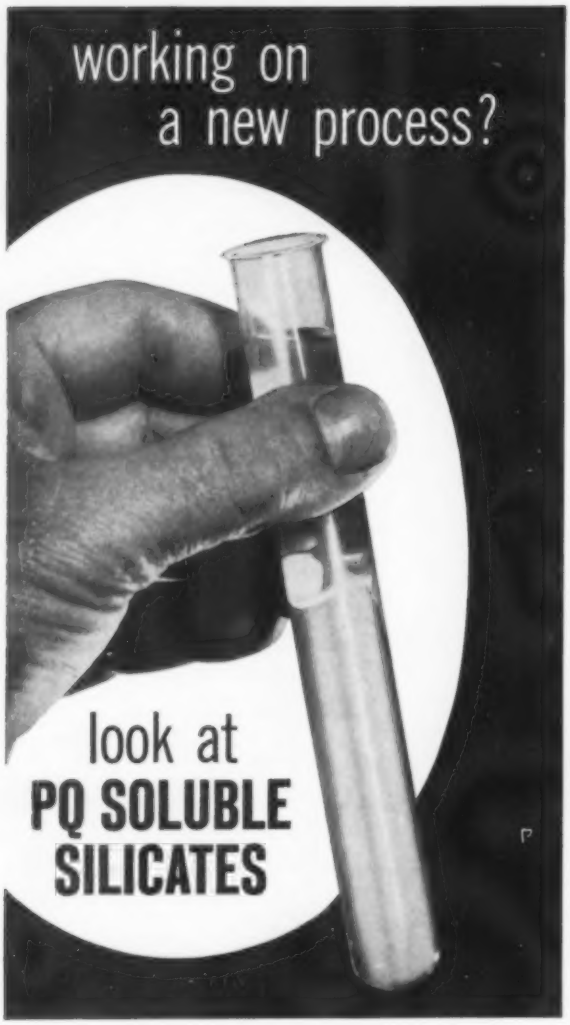

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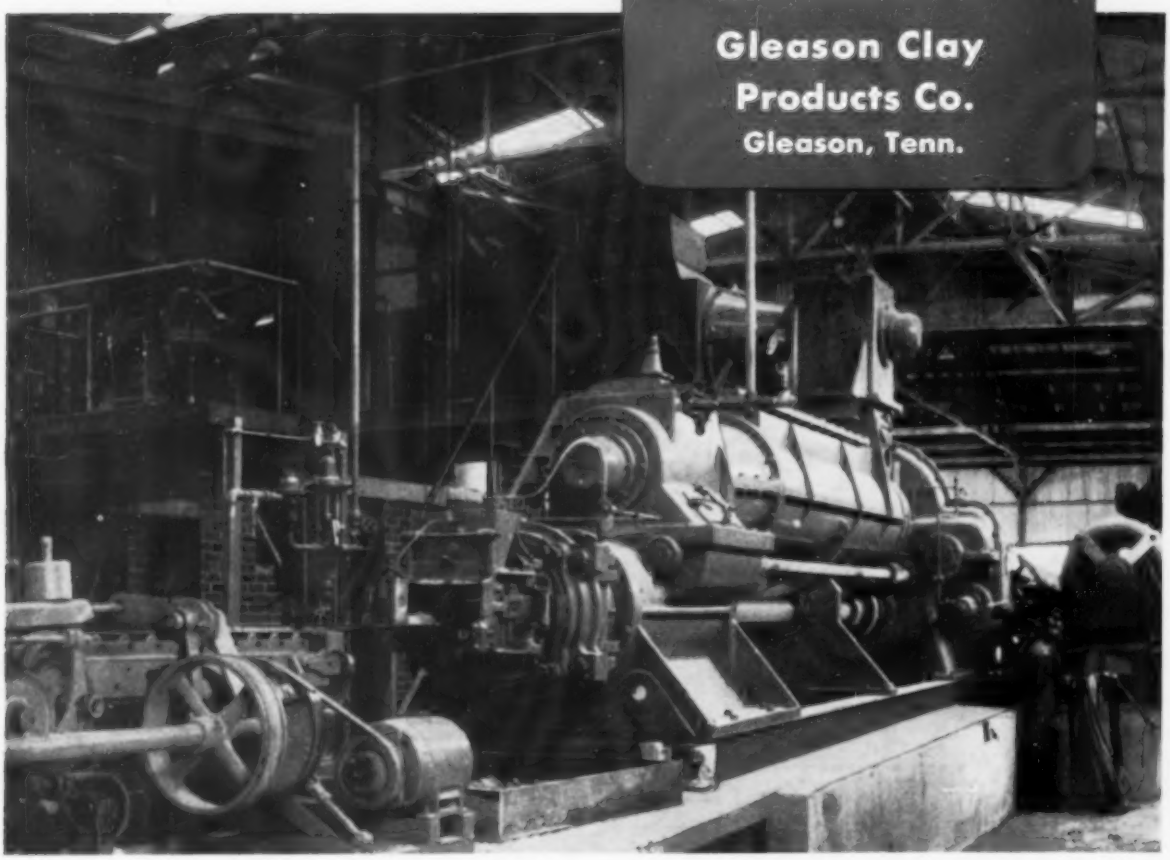

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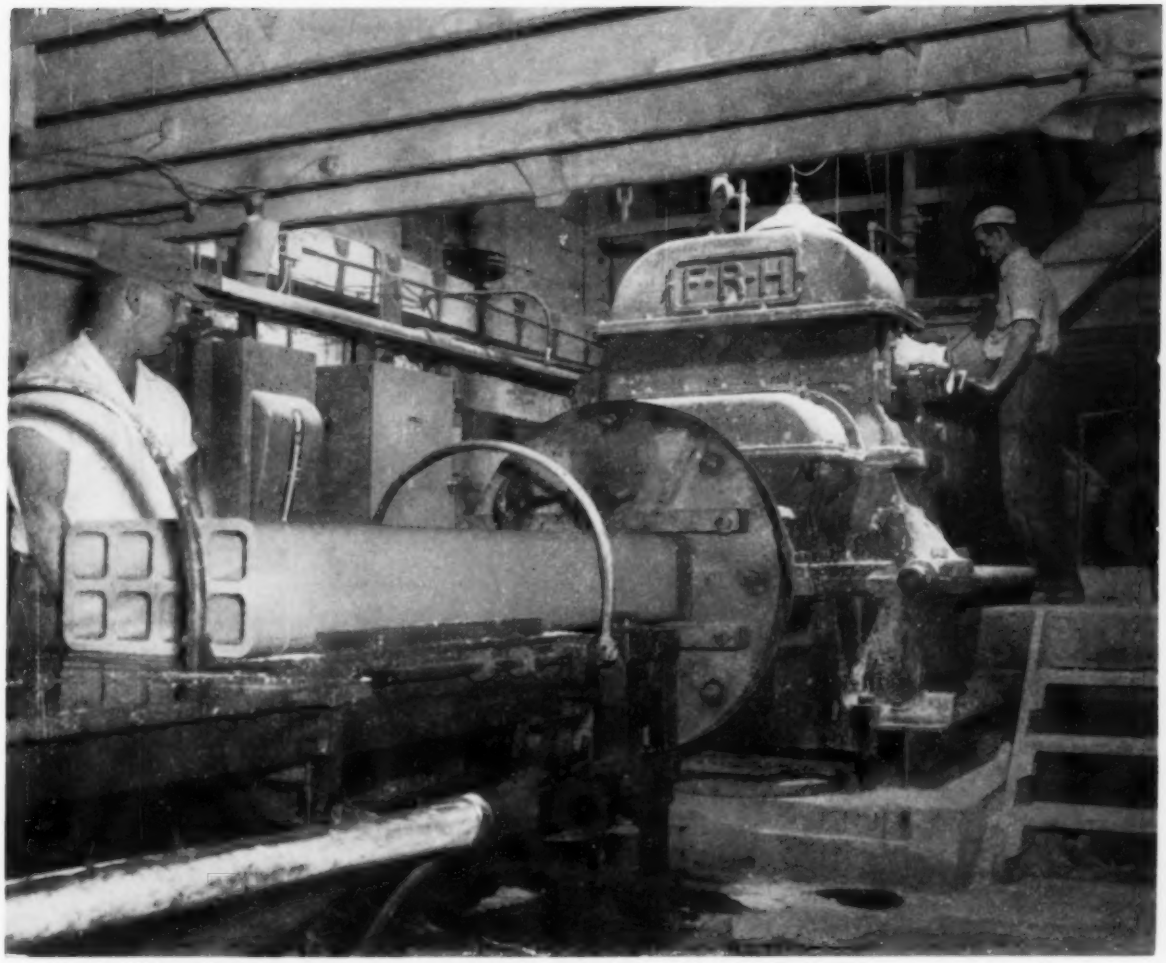
Circle Service No. 88



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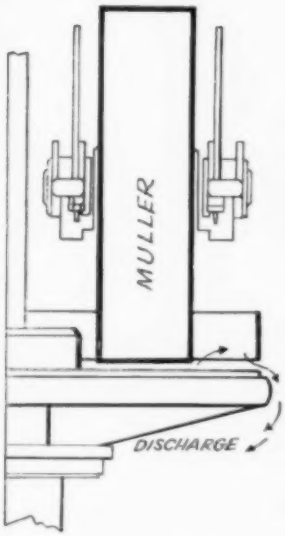

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